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Proceedings at the Forty-Second Annual Meeting

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*** START OF THE PROJECT GUTENBERG EBOOK NORTHERN NUT GROWERS ASSOCIATION
REPORT OF THE PROCEEDINGS AT THE FORTY-SECOND ANNUAL MEETING ***

DISCLAIMER

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The articles published in the Annual Reports of the Northern Nut Growers Association are the findings and thoughts solely of the authors and are not to be construed as an endorsement by the Northern Nut Growers Association, its board of directors, or its members. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The laws and recommendations for pesticide application may have changed since the articles were written. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The discussion of specific nut tree cultivars and of specific techniques to grow nut trees that might have been successful in one area and at a particular time is not a guarantee that similar results will occur elsewhere.

**NORTHERN
NUT GROWERS ASSOCIATION**

INCORPORATED

AFFILIATED WITH THE AMERICAN HORTICULTURAL SOCIETY

42nd Annual Report

Annual Meeting at

URBANA, ILLINOIS

August 28, 29 and 30, 1951

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Jacobs Persian Walnut Genoa, Ohio (see pages [86-87](#))

The above picture shows a view made last winter of the original Jacobs Persian walnut in Elmore, Ohio. Member Malcolm R. Bumler of Detroit stands under the tree. The picture was made by Mr. W. G. Schmidt and the engraving is by courtesy of Gilbert Becker, our Michigan vice president and president of the Michigan Nut Growers Association.

The Jacobs variety, a second generation seedling of a German walnut, was brought to the attention of the NNGA by Sylvester Shessler, Genoa, Ohio, who has been regularly taking prizes with it and another seedling he found growing at Clay Center. The Jacobs was fourth in the 1950-51 NNGA contest, having a good nut with 47.1% kernel. The tree, now over seventy years old, bears regularly, having 200 pounds of nuts in one recent year. Several members in Ohio, Michigan, and other states are propagating the Jacobs, and it appears to be one of the most promising non-Carpathian Persian varieties for the Midwest.—J. C. McDaniel

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Foreword

This volume is going to press somewhat later than was anticipated, and in order to expedite its publication, a few papers which were contributed in 1951 are being held over for the 1952 Report. Two of these will incorporate new data to be presented at the 1952 meeting, Mr. E. A. Curl's discussion on the status of the oak wilt disease and Mr. W. W. Magill's talk on top working of native pecans in southwestern Kentucky. Also deferred are Mr. L. Walter Sherman's "Final Selections in the Five-Year Ohio Black Walnut Contest", the vice-presidents' round table discussion led by Mr. H. F. Stoke, on "What Black Walnut Varieties Shall We Recommend for Planting?" and two short papers from the Ohio section.

"Bunch Disease of Black Walnut" by Drs. McKay and Crane in this volume was read at the 1950 Pleasant Valley Meeting, and the discussion on it will be found in last year's Report. Other "Extras" are the propagation papers by Mr H. P. Burgart and Mr. Gilbert L. Smith, Dr. J. Russell Smith's and Mr Carl Weschcke's papers on pecans, and the reprinted article on Colby Persian walnut by the secretary. (The original tree has a big crop of nuts now maturing.)

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Officers of the Association 1951-1952

President: Dr. L. H. MacDaniels, Floriculture Department, Cornell University, Ithaca, New York

Vice-President: Richard B. Best, Columbiana Seed Co., Eldred, Illinois

Secretary: J. C. McDaniel, University of Illinois, Dept. of Horticulture, Urbana, Ill.

Treasurer: Carl F. Prell, 825 J. M. S. Bldg., South Bend 1, Indiana

Directors: The officers and the following past presidents:

Mildred Jones Langdoc, P. O. Box 136, Erie, Illinois

Dr. William Rohrbacher, 811 E. College St., Iowa City, Iowa

COMMITTEES 1951-1952

Program Committee:

Royal Oakes, Chairman (Ill.); J. Ford Wilkinson (Ind.); Spencer Chase (Tennessee); Ira M. Kyhl (Iowa); A. S. Colby (Ill.); W. D. Armstrong (Kentucky); and J. C. McDaniel (Ill.) ex-officio.

Publications—Editorial Section:

Lewis E. Theiss, Chairman (Penn.); W. C. Deming (Conn.); John Davidson (Ohio), Arthur H. Graves (Conn.); and Mrs. Herbert Negus (Md.).

Publications—Printing Section:

G. L. Slate, Chairman (N.Y.); Carl F. Prell (Ind.); and J. C. McDaniel (Ill.) ex-officio.

Place of Meeting:

R. P. Allaman, Chairman (Penn.); George Salzer (N.Y.); John Rick (Penn.); Arthur H. Graves (Conn.); and Elton E. Papple (Ontario, Canada).

Varieties and Contest—Survey:

H. F. Stoke, Chairman (Va.); A. G. Hirschi (Okla.); L. W. Sherman (Mich.); Sylvester Shessler (Ohio); F. L. O'Rourke (Mich.).

Standards and Judging:

Spencer Chase, Chairman (Tenn.); Gilbert L. Smith (N.Y.); Raymond E. Silvis (Ohio).

Research:

H. L. Crane, Chairman (Md.); G. F. Gravatt (Md.); Paul E. Machovina (Ohio); George L. Slate (N.Y.).

Membership:

R. B. Best, Chairman (Ill.); Gilbert L. Smith (N.Y.); Sterling Smith (Ohio); Dr. Clyde Gray (Kans.); Louis Gerardi (Ill.); Carl F. Prell (Ind.) ex-officio.

Exhibits:

Sylvester Shessler (Ohio), Chairman; A. G. Hirschi (Okla.); Fayette Etter (Penn.); J. U. Gellatly (B. C., Canada); Carl Weschcke (Minn.).

Auditing:

Sterling A. Smith (Ohio); Carl Weschcke (Minn.).

Legal Adviser:

Sargent Wellman (Mass).

Official Journal:

American Fruit Grower, Willoughby, Ohio

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State and Foreign Vice-Presidents

Alabama, Edward L. Hiles, Loxley
Alberta, Canada A. L. Young, Brooks
Belgium R. Vanderwaeren, Bierbeekstraat, 310, Korbeek-Lo
British Columbia, Canada J. U. Gellatly, Box 19, Westbank
California Thos. R. Haig, M.D., 3021 Highland Ave., Carlsbad
Connecticut A. M. Huntington, Stanerigg Farms, Bethel
Delaware Lewis Wilkins, Route 1 Newark
Denmark Count F. M. Knuth, Knuthenborg, Bandholm
District of Columbia Edwin L. Ford, 3634 Austin St., S.E., Washington 20
Florida C. A. Avant, 960 N.W., 10th Avenue, Miami
Georgia William J. Wilson, North Anderson Ave., Fort Valley
Hong Kong P. W. Wang, 6 Des Voeux Rd., Central
Idaho Lynn Dryden, Peck
Illinois Royal Oakes, Bluffs (Scott County)
Indiana Ford Wallick, Route 4, Peru
Iowa Ira M. Kyhl, Box 236, Sabula
Kansas Dr. Clyde Gray, 1045 Central Avenue, Horton
Louisiana Dr. Harald E. Hammar, 608 Court House, Shreveport
Maryland Blaine McCollum, White Hall
Massachusetts S. Lathrop Davenport, 24 Creeper Hill Rd., North Grafton
Michigan Gilbert Becker, Climax
Minnesota R. E. Hodgson, Southeastern Exp. Station, Waseca
Mississippi James R. Meyer, Delta Branch Exper Station, Stoneville
Missouri Ralph Richterkessing, Route 1, Saint Charles
Nebraska Harvey W. Hess, Box 209, Hebron
New Hampshire Matthew Lahti, Locust Lane Farm, Wolfeboro
New Jersey Mrs. Alan R. Buckwalter, Route 1, Flemington
New Mexico Rev. Titus Gehring, P. O. Box 177, Lumberton
New York George Salzer, 169 Garford Road, Rochester 9
North Carolina Dr. R. T. Dunstan, Greensboro College, Greensboro
North Dakota Homer L. Bradley, Long Lake Refuge, Moffit
Ohio A. A. Bungart, Avon
Oklahoma A. G. Hirschi, 414 N. Robinson, Oklahoma City
Ontario, Canada Elton E. Papple, Cainsville
Oregon Harry L. Percy, Route 2, Box 190, Salem
Pennsylvania R. P. Allaman, Route 86, Harrisburg
Prince Edward Island, Canada Robert Snazelle, Forest Nursery, Rt. 5,
Charlottetown
Rhode Island Philip Allen, 178 Dorance St., Providence

South Carolina John T. Bregger, P. O. Box 1018, Clemson
South Dakota Herman Richter, Madison
Tennessee W. Jobe Robinson, Route 7, Jackson
Texas Kaufman Florida, Box 154, Rotan
Utah Harlan D. Petterson, 2076 Jefferson Avenue, Ogden
Vermont Joseph N. Collins, Route 3, Putney
Virginia H. R. Gibbs, Linden
Washington Carroll D. Bush, Grapeview
West Virginia Wilbert M. Frye, Pleasant Dale
Wisconsin C. F. Ladwig, 2221 St. Laurence, Beloit

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Attendance Register

Urbana Meeting, August 28-29, 1951

Mr. and Mrs. R. P. Allaman, 803 N. 16th St., Harrisburg, Pennsylvania
Dr. H. W. Anderson, University of Illinois, Urbana, Illinois
Professor W. D. Armstrong, Western Kentucky Exp. Substation, Princeton,
Kentucky
Mr. Adin Baber, Kansas, Illinois
Mr. and Mrs. F. C. Baker, Troy, Kansas
Mr. Richard Barcus, Massillon, Ohio
Mr. Paul J. Bauer, 123 S. 29th, Lafayette, Indiana
Mr. Gilbert Becker, Climax, Michigan
Mr. W. M. Beckert, Jackson, Michigan
Mr. and Mrs. Stephen Bernath, Rt. 3, Poughkeepsie, New York
Mr. Charles B. Berst, Erie, Pennsylvania
Mr. and Mrs. R. B. Best, Eldred, Illinois
Dr. C. J. Birkeland, University of Illinois, Urbana, Illinois
Mr. A. S. Brock, 1733 N. McVicker Avenue, Chicago 30, Illinois
Mr. Morrison Brown, Ickesburg, Pennsylvania
Mr. S. C. Chandler, Carbondale, Illinois
Mr. Spencer B. Chase, Norris, Tennessee
Mr. William S. Clarke, Jr., Box 167, State College, Pennsylvania
Dr. and Mrs. A. S. Colby, University of Illinois, Urbana, Illinois
Mr. George Hebden Corsan, Echo Valley, Toronto 18, Canada
Mrs. Lilian V. Corsan, Echo Valley, Toronto 18, Canada
Mr. George E. Craig, Dundas, Ohio
Dr H. L. Crane, Plant Industry Station, Beltsville, Maryland
Mrs. Harley L. Crane, Washington, D. C.
Mr. and Mrs. John Davidson, Xenia, Ohio
Mr. Roy H. Degler, Jefferson City, Missouri
Dr. Oliver D. Diller, Ohio Agricultural Experiment Station, Wooster, Ohio
Mr. Kenneth A. Dooley, Rt. 2, Marion, Indiana
Dr. L. L. Dowell, 529 North Avenue, N.E., Massillon, Ohio
Mr. Ralph Emerson, Detroit, Michigan
Mr. A. B. Ferguson, Center Point, Iowa
Mr. and Mrs. Frank H. Frey, 2315 W. 108th Place, Chicago, Illinois
Mr. Wilbur S. Frey, 820 W 72nd St., Kansas City, Missouri
Mr. O. H. Fuller, Joliet, Illinois
Mr. Louis Gerardi, Caseyville, Illinois
Mr. Charles Gerstenmaier, 13 Pond St., S.W., Massillon, Ohio
Mr. John A. Gerstenmaier, 13 Pond St., S.W., Massillon, Ohio
Dr. Edward A. Grad and family, 1506 Chase St., Cincinnati 23, Ohio
Mr. G. A. Gray, Bartlesville, Oklahoma
Mr. H. W. Guengerich, Stark Bros. Nursery, Louisiana, Missouri
Mr. H. C. Helmle, 526 South Grand Avenue, W., Springfield, Illinois
Dr. V. W. Kelley, University of Illinois, Urbana, Illinois
Mr. and Mrs. Frank M. Kintzel, 2506 Briarcliffe, Cincinnati 13, Ohio
Ralph Kreider, Jr., Rt. 1, Hammond, Illinois
Mr. and Mrs. Ira M. Kyhl, Sabula, Iowa
Mr. Clarence F. Ladwig, Rt. 2, Beloit, Wisconsin
Jeanne Ellen Langdoc, Erie, Illinois
Mr. and Mrs. Wesley W. Langdoc, Erie, Illinois
Mr. Michael Lee, Milford, Michigan
Dr. L. H. MacDaniels, 422 Chestnut St., Ithaca, New York
Mr. P. E. Machovina, 1228 Northwest Blvd., Columbus 12, Ohio
Professor W. W. Magill, University of Kentucky, Lexington 25, Kentucky
Mr. J. C. McDaniel, University of Illinois, Urbana, Illinois
J. C. McDaniel, Jr., Urbana, Illinois
Mr. J. W. McKay, U.S.D.A. Beltsville, Maryland

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Mr. J. Warren McKay, 4815 Osage St., College Park, Maryland
 Mr. A. J. Metzger, Toledo 6, Ohio
 Mr. Elwood Miller, 450 E. Chapel St., Hazleton, Pennsylvania
 Mrs. Elwood Miller, 450 E. Chapel St., Hazleton, Pennsylvania
 Mr. and Mrs. Herbert Negus, 5031-56th Ave., Roger Heights, Hyattsville,
 Maryland
 Mr. and Mrs. Royal Oakes, Bluffs, Illinois
 Mrs. E. N. O'Rourke, Tipton, Michigan
 Mr. and Mrs. F. L. O'Rourke, Hidden Lake Gardens, Tipton, Michigan
 Mr. John H. Page, Dundas, Ohio
 Mr. Edward W. Pape, Rt. 2, Marion, Indiana
 Mr. Christ Pataky, Jr., Mansfield, Ohio
 Mr. Carl F. Prell, 825 J.M.S. Bldg., South Bend 1, Indiana
 Mrs. C. A. Reed, 7309 Piney Branch Road, Washington 12, D.C.
 Mr. John Renken, St. Charles, Missouri
 Mr. Ralph Richterkessing, Rt. 1, St. Charles, Missouri
 Mr. John Rick, Reading, Pennsylvania
 Dr. and Mrs. W. M. Rohrbacher, 811 E. College St., Iowa City, Iowa
 Mr. E. T. Rummel, 16613 Laverne Avenue, Cleveland 11, Ohio
 Mr. and Mrs. George Salzer, 169 Garford Road, Rochester 9, N. Y.
 Mr. Rodman Salzer, 169 Garford Road, Rochester 9, N.Y.
 Mr. L. Walter Sherman, 220 Fairview Avenue, Canfield, Ohio
 (New address for Sherman)
 Mr. Sylvester Shessler, Genoa, Ohio
 Mr. Raymond E. Silvis, 59 First St., S.E., Massillon, Ohio
 Mr. Douglas A. Smith, 630 W. South St., Vermilion, Ohio
 Mr. and Mrs. Sterling A. Smith, 630 W. South St., Vermilion, Ohio
 Mr. D. C. Snyder, Center Point, Iowa
 Mr. and Mrs. W. F. Sonnemann, Vandalia, Illinois
 Miss Elizabeth Ann Sonnemann, Vandalia, Illinois
 ± Mr. Alfred Szego, 77-15a 37th Ave., Jackson Hgts., New York, N. Y.
 Mr. Ford Wallick, Peru, Indiana
 Prof. W. B. Ward, Purdue University, West Lafayette, Indiana
 Mrs. Harry R. Weber, Box 42, Miamitown, Ohio
 (Now Mrs. Herbert Krone of Rt. 1, Lancaster, Pa.)
 Mr. A. M. Whitford, Farina, Illinois
 Mr. Gordon Zethmayr, Rt. 1, West Chicago, Illinois
 Mrs. G. A. Zimmerman, Rt. 1, Linglestown, Pennsylvania

CONSTITUTION

of the

NORTHERN NUT GROWERS ASSOCIATION, INCORPORATED

(As adopted September 13, 1948)

NAME

ARTICLE I. This Society shall be known as the Northern Nut Growers Association, Incorporated. It is strictly a non-profit organization.

PURPOSES

ARTICLE II. The purposes of this Association shall be to promote interest in the nut bearing plants; scientific research in their breeding and culture; standardization of varietal names; the dissemination of information concerning the above and such other purposes as may advance the culture of nut bearing plants, particularly in the North Temperate Zone.

MEMBERS

ARTICLE III. Membership in this Association shall be open to all persons interested in supporting the purposes of the Association. Classes of members are as follows: Annual members, Contributing members, Life members, Honorary members, and Perpetual members. Applications for membership in the Association shall be presented to the secretary or the treasurer in writing, accompanied by the required dues.

OFFICERS

ARTICLE IV. The elected officers of this Association shall consist of a President, a Vice-president, a Secretary and a Treasurer or a combined Secretary-treasurer as the Association may designate.

BOARD OF DIRECTORS

ARTICLE V. The Board of Directors shall consist of six members of the Association who shall be the officers of the Association and the two preceding elected presidents. If the offices of Secretary and Treasurer are combined, the three past presidents shall serve on the Board of Directors.

There shall be a State Vice-president for each state, dependency, or country represented in the membership of the Association, who shall be appointed by the President.

AMENDMENTS TO THE CONSTITUTION

ARTICLE VI. This constitution may be amended by a two-thirds vote of the members present at any annual meeting, notice of such amendment having been read at the previous annual meeting, or copy of the proposed amendments having been mailed by the Secretary, or by any member to each member thirty days before the date of the annual meeting.

BY-LAWS

(Revised and adopted at Norris, Tennessee, September 13, 1948)

SECTION I.—MEMBERSHIP

Classes of membership are defined as follows:

ARTICLE I. ANNUAL MEMBERS. Persons who are interested in the purposes of the Association who pay annual dues of Three Dollars (\$3.00).

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ARTICLE II. CONTRIBUTING MEMBERS. Persons who are interested in the purposes of the Association who pay annual dues of Ten Dollars (\$10.00) or more.

ARTICLE III. LIFE MEMBERS. Persons who are interested in the purposes of the Association who contribute Seventy Five Dollars (\$75.00) to its support and who shall, after such contribution, pay no annual dues.

ARTICLE IV. HONORARY MEMBERS. Those whom the Association has elected as honorary members in recognition of their achievements in the special fields of the Association and who shall pay no dues.

ARTICLE V. PERPETUAL MEMBERS. "Perpetual" membership is eligible to any one who leaves at least five hundred dollars to the Association and such membership on payment of said sum to the Association shall entitle the name of the deceased to be forever enrolled in the list of members as "Perpetual" with the words "In Memoriam" added thereto. Funds received therefor shall be invested by the Treasurer in interest bearing securities legal for trust funds in the District of Columbia. Only the interest shall be expended by the Association. When such funds are in the treasury the Treasurer shall be bonded. Provided: that in the event the Association becomes defunct or dissolves, then, in that event, the Treasurer shall turn over any funds held in his hands for this purpose for such uses, individuals or companies that the donor may designate at the time he makes the bequest of the donation.

SECTION II.—DUTIES OF OFFICERS

ARTICLE I. The President shall preside at all meetings of the Association and Board of Directors, and may call meetings of the Board of Directors when he believes it to be the best interests of the Association. He shall appoint the State Vice-presidents; the standing committees, except the Nominating Committee, and such special committees as the Association may authorize.

ARTICLE II. Vice-president. In the absence of the President, the Vice-president shall perform the duties of the President.

ARTICLE III. Secretary. The Secretary shall be the active executive officer of the Association. He shall conduct the correspondence relating to the Association's interests, assist in obtaining memberships and otherwise actively forward the interests of the Association, and report to the Annual Meeting and from time to time to meetings of the Board of Directors as they may request.

ARTICLE IV. Treasurer. The Treasurer shall receive and record memberships, receive and account for all moneys of the Association and shall pay all bills approved by the President or the Secretary. He shall give such security as the Board of Directors may

require or may legally be required, shall invest life memberships or other funds as the Board of Directors may direct, subject to legal restrictions and in accordance with the law, and shall submit a verified account of receipts and disbursements to the Annual meeting and such current accounts as the Board of Directors may from time to time require. Before the final business session of the Annual Meeting of the Association, the accounts of the Treasurer shall be submitted for examination to the Auditing Committee appointed by the President at the opening session of the Annual Meeting.

ARTICLE V. The Board of Directors shall manage the affairs of the association between meetings. Four members, including at least two elected officers, shall be considered a quorum.

SECTION III.—ELECTIONS

ARTICLE I. The Officers shall be elected at the Annual Meeting and hold office for one year beginning immediately following the close of the Annual Meeting.

ARTICLE II. The Nominating Committee shall present a slate of officers on the first day of the Annual Meeting and the election shall take place at the closing session. Nominations for any office may be presented from the floor at the time the slate is presented or immediately preceding the election.

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ARTICLE III. For the purpose of nominating officers for the year 1949 and thereafter, a committee of five members shall be elected annually at the preceding Annual Meeting.

ARTICLE IV. A quorum at a regularly called Annual Meeting shall be fifteen (15) members and must include at least two of the elected officers.

ARTICLE V. All classes of members whose dues are paid shall be eligible to vote and hold office.

SECTION IV.—FINANCIAL MATTERS

ARTICLE I. The fiscal year of the Association shall extend from October 1st through the following September 30th. All annual memberships shall begin October 1st.

ARTICLE II. The names of all members whose dues have not been paid by January 1st shall be dropped from the rolls of the Society. Notices of non-payment of dues shall be mailed to delinquent members on or about December 1st.

ARTICLE III. The Annual Report shall be sent to only those members who have paid their dues for the current year. Members whose dues have not been paid by January 1st shall be considered delinquent. They will not be entitled to receive the publication or other benefits of the Association until dues are paid.

SECTION V.—MEETINGS

ARTICLE I. The place and time of the Annual Meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the Board of Directors shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the President and Board of Directors.

SECTION VI.—PUBLICATIONS

ARTICLE I. The Association shall publish a report each fiscal year and such other publications as may be authorized by the Association.

ARTICLE II. The publishing of the report shall be the responsibility of the Committee on Publications.

SECTION VII.—AWARDS

ARTICLE I. The Association may provide suitable awards for outstanding contributions to the cultivation of nut bearing plants and suitable recognition for meritorious exhibits as may be appropriate.

SECTION VIII.—STANDING COMMITTEES

As soon as practical after the Annual Meeting of the Association, the President shall appoint the following standing committees:

- 1. Membership
- 2. Auditing
- 3. Publications
- 4. Survey

- 5. Program
- 6. Research
- 7. Exhibit
- 8. Varieties and Contests

SECTION IX.—REGIONAL GROUPS AND AFFILIATED SOCIETIES

ARTICLE I. The Association shall encourage the formation of regional groups of its members, who may elect their own officers and organize their own local field days and other programs. They may publish their proceedings and selected papers in the yearbooks of the parent society subject to review of the Association's Committee on Publications.

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ARTICLE II. Any independent regional association of nut growers may affiliate with the Northern Nut Growers Association provided one-fourth of its members are also members of the Northern Nut Growers Association. Such affiliated societies shall pay an annual affiliation fee of \$3.00 to the Northern Nut Growers Association. Papers presented at the meetings of the regional society may be published in the proceedings of the parent society subject to review of the Association's Committee on Publications.

SECTION X.—AMENDMENTS TO BY-LAWS

ARTICLE I. These by-laws may be amended at any Annual Meeting by a two-thirds vote of the members present provided such amendments shall have been submitted to the membership in writing at least thirty days prior to that meeting.

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Forty-Second Annual Meeting Northern Nut Growers Association, Inc. August 28, 29 and 30, 1951 Urbana, Illinois

At the evening session on August 27, Dr. William Rohrbacher presented Dr. Arthur S. Colby, of the University of Illinois, who informally welcomed the gathering and set forth in detail the plans for the convention, with directions for finding different buildings, and suggestions concerning the several scheduled events. Dr. Colby concluded his talk by calling for a few remarks from one of our Canadian members, George H. Corsan, of Toronto, who is probably (with Dr. Deming) one of two nonagenarians in the association.

Mr. Corsan spoke as follows:

MR. CORSAN: My neck is still stiff. On the 27th of May I was up looking at a budding and I was coming down a 40-foot ladder, and when I was 22 feet from the ground the ladder had a bad rung and I took a head-first dive for the earth. I believe my tissues were made out of nuts, fruit, honey, and grain and I was able to survive. I looked exactly like a man in the gallows. They said, "You will be in the hospital for eight weeks or more." In two weeks and two days I was hoeing corn.

On the way here I dropped into various places that were of interest. Jack Miners. The place is really better than when their father was alive. I came over across the river and dropped into Battle Creek.

I spent a good time hunting for Kellogg and I couldn't find him. One person told me he was dead. He was quite peppy over the telephone and I was amazed because he had been ill and well, then ill and then well. He says, "Come on over. I am ready and looking for you." He wrote me a letter scolding me. He asked where I was going and I told him. I asked him, "Do you know you are a life member of that association?"

He has a monster dog descended from Rin-Tin-Tin and that dog is clean, intelligent and looks like a human being. He is on the shore of Gull Lake, a seven-mile-long, one-mile-wide lake. Marvelous looking. He had abandoned his big house and he gave that to soldiers and sailors and sick men. I had asked for him and they have never heard of him. That's how he hides himself. He is back on the lake again. So I hunted and found a house so unique that no one but he could have a house like that built. There he was and he was peppy as ever. He has a new man on the bird sanctuary. He was fully alive.

I don't want to take up any more of your time. I have had call on me an enormous number of people who are more interested in nut growing than ever. I can't blame them, with the price of meat so high, and so many doctors advising the displacement of animal foodstuff by the eating of nuts.

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It was on my 94th birthday that I got a plaster cast and was in it two weeks and two days. I will tell you a little secret. I was supposed to have a diet. They had a dietician and I said I didn't need to eat anything. I drank orange juice and pineapple juice and apple juice and grapefruit juice. I

ate some European black bread with caraway seeds; it tasted bitter. I don't eat so much as I did before the accident. I am trying to be careful of myself.

I want to have a talk with Wilkinson on the black walnut. I have four big trees of Stabler, and hardly a nut grows on them. Down there they behave themselves and have big crops. How do they have such big crops? I like them. I don't believe there is a tastier nut in the world. Even my hybrid Asiatic butternut cross. I have got quite a lot of them here to show you and the biggest filberts in the world and they are all seedlings.

Not a hickory nut, butternut or black walnut. I had a ton of black walnuts. There is a good crop of hybrids, filberts, English walnuts, and there are some other nuts. I am north of Lake Ontario. When any of you are going across, drop in and see me.

TUESDAY MORNING SESSION

DR. ROHRBACHER: Will you please come to order. My gavel is in Iowa City, so I will use my pocket knife. We have to make a little change in our program. Our leader, Mr. Magill, is not yet here.

First on our program this morning will be Dr. C. J. Birkeland, head of the Department of Horticulture at the University of Illinois. It's wonderful to have such a splendid response so early in the morning.

DR. BIRKELAND: It is certainly nice to see such a big turnout and we certainly welcome you to Illinois. We have been interested in nuts for a long time and probably will be more interested in the future. We have one man on our staff who has for years been interested. Now that we have two, we will be twice as interested. In the past, years ago, the Endicotts probably pioneered in a new variety of nuts. Later on, the Caspers and Gerardis and Whitfords and now the Oakes and Best families are doing a lot of work in the propagation of new and better varieties. We have a lot of areas in Illinois suitable for nut propagation, with the Wabash, Illinois, and Mississippi rivers, and we have been working with farm advisers and other groups to increase nut production and now we have a new horticultural experimental station in the southern part of the state. There is a lot of land suitable for that type of production.

Out on the horticultural farm we have, I guess, several hundred seedlings and varieties of nuts which you will probably see. I hope your stay here will be a lot of fun as well as profitable.

DR. CRANE: It is a great pleasure for me, and I know from the expression that I have had from those with whom I have talked, also for the members of the Northern Nut Growers Association who are here to be able to meet in Urbana as guests of the University of Illinois. As a matter of fact, we have tried and wanted to come out here for quite a long while, but we didn't have a good invitation and we are glad to accept—here we are!

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The members of the Northern Nut Growers Association are all good people and they are very much interested in nut growing, not so much from the standpoint of making a fabulous income and being able to retire on an unlimited bank account on ten acres of land in nut trees, but they get a lot of pleasure out of fooling with them as a hobby, and in order that they might more or less through their trees respond under God's loving care.

This is the 42nd annual meeting of the Northern Nut Growers Association, so it is no longer a baby. It is growing up. I don't know what the membership is at the present time. The secretary is going to tell us what the membership is this afternoon. It has gotten to be quite a sizable organization. We welcome the opportunity of coming out here to Illinois to see some of the nut orchards and nut trees in this great state, particularly pecans, although we do see quite a lot of hickories and also walnuts.

We certainly thank you, Dr. Birkeland, for your welcome and I know that our pleasure here is going to be unlimited. We thank you.

DR. ROHRBACHER: Thank you, Dr. Crane. We had them bring up some water to take care of our whistles.

At this time I'd like to present our address.

President's Address

I want to say it is a real privilege and pleasure for me to visit with you today and to have the honor of serving as your president for the past year. I have always been impressed with the enthusiasm and optimism of this group. You know enthusiasm and optimism are highly contagious, and I look forward each year with great anticipation to my regular inoculation.

It is particularly fitting that we assemble here with a common goal and purpose and also with the common knowledge that there is much work to be done. This society, which was formed 42 years ago, has enjoyed great progress and I wish to commend the men who had the vision to conceive this association and nurture it to manhood. Their accomplishments were indeed fruitful. However, there is still room and need for a program of expansion. It is our responsibility and

obligation to see that this growth continues. The rings of growth on a tree trunk push outward and continually expand and grow—so must our association. Sometimes we become so deeply engrossed in what we are doing or trying to do that it is advisable to back up and take a broadside view of our objectives and purpose. In other words, we sometimes cannot see the forest for the trees.

I should like at this time to review the real intent and purpose of the Northern Nutgrowers Association. The defined purpose of this association, as stated in the Constitution, is to promote: (1) Interest in nut bearing plants; (2) Scientific research in their breeding and culture; (3) Standardization of varietal names; (4) The dissemination of information concerning the above and such other purposes as may advance the culture of nut bearing plants.

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We are very happy that the 1951 convention has come to Illinois, which represents the western rim of this group. Only one meeting was held farther west, and that was held in Iowa in 1915, when my good friend and fellow Iowan, D. C. Snyder's brother, was active and contributed so much to nut culture in this country. The late Sam Snyder's, as well as D. C.'s untiring efforts, did much to originate and develop some of the finest named walnut and hickory nuts in Iowa. Through the years many other good nuts of the black walnut, hickory, pecan, Persian walnut and chestnut have been added to the ever-growing list. It is my considered opinion that one of the real questions that must be answered and answered intelligently, based on actual experience, is what nut trees shall I plant now?

It is only natural that the list of different varieties has grown so long in nearly every variety that we should concern ourselves particularly with point three of our objectives, which I have reviewed with you—that being the standardization and selection of varietal names. In order that nut culture be extended and expanded for profit, as well as satisfaction, I feel this is a real problem. It is my considered judgment that a definite culling must be done. Those of us who find our favorite nut tree meeting the axe may propagate it on a personal basis. The fact remains however that a definite list of approved varieties, based on actual experience and performance, is needed. We will save many a heartache, much time, work, and money by knowing more definitely what to plant. This would enable the nurseryman or the propagator of nut trees to reduce the number of varieties it has been necessary to carry in the past. It is imperative that any growing business have a broad commercial base. The nurseryman is seeking information on the most desirable varieties because it is unprofitable for him to carry a huge inventory of varieties he feels are most desirable, yet are called for the least. It has been my experience that the nurserymen in Iowa are limiting the number of species for propagating purposes. They are making a selection of varieties based on their own judgment, which may be good or perhaps could be better. If more standardization and selection could be obtained, the nurseryman could and would propagate more of the varieties that are recommended for their particular localities. In my opinion, it is our responsibility to help furnish this information.

With this in mind, we have named a committee to work on this important problem during the past year. The very capable and efficient Mr. H. F. Stoke has been working with the vice-presidents of our organization to survey the black walnut through the black walnut belt. I am sure we all are anxious to learn about their findings and accomplishments later in this conference. It is my sincere hope that this report and the forum round table discussion will give all of us a better understanding of which black walnut to plant in each respective locality. If we can accomplish this one problem at this meeting, I feel this conference would be most worthwhile and be a contributing factor to an ever-expanding production of good black walnuts in this country.

If we can make real progress on the black walnut, and I am confident we can, the other varieties such as the hickory, Persian walnut, chestnut, and the lesser grown nuts, can be dealt with in the future.

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This matter of selecting the best variety of black walnuts for a particular locality has been of interest to me ever since I became interested in the fascinating subject and practice of growing nut trees. Furthermore, I have become increasingly interested in this during each succeeding year. If you will pardon a personal reference, we started out by planting some of each variety that appealed to me that was being propagated or sold by nurserymen. In the beginning years we experienced difficulty with two factors: namely, cattle and flood waters. We still have a number of varieties but have discarded many for a number of reasons. However, in the next few years the trees will be ready to bear and will furnish many of the answers concerning production in our own locality. This single project may save future planters of nut trees many heartaches and, more important, loss of time—because they will know what to plant.

That sentence in essence is my main thought for the day—and year. And as a final example we could read the parable from the book of Matthew of the man who sowed seed but an enemy sowed tares and the servants asked if they should pull the tares. But Jesus said, "No, because in so doing they might uproot the wheat. Rather," said He, "wait until the harvest, then separate the tares from the wheat."

Earlier it was mentioned that we all like to be identified with a growing or expanding business or project. It is my firm conviction that we all should do more to promote more and better nut trees. We need more planters of a few nut trees as well as a few planters with many trees.

We have recently seen a tremendous rebirth of interest in grassland farming in this country. This is constructive and sound for the long pull. Livestock and proper land use are natural companions. Another ally and companion in this whole movement should be good walnut trees in

every pasture, a few nut trees in every farm lot, in the fence row and corner of the farm. I am sure that our educational agencies would be very receptive to putting more emphasis on this sound and fundamental practice. Good pasture lands, clear streams, plenty of trees for shade are all important and real assets to any farm. Shade produced by a tree is incomparable to any man-made structure. Instead of compromising with any shade tree let us all accept it as our mission to educate the people to know that nut trees are the most economical and useful. Then, after a summer of furnishing the finest shade from the summer heat, fall would bring an abundant harvest of highly desirable edible nuts for the household and perhaps a few more for a city neighbor who may not have been so fortunate.

Thus, in closing, may I again emphasize that it is my sincere hope that the survey, which has been completed by Mr. Stoke through the good cooperation of the vice presidents, will result in a more intelligent selection of the best black walnuts for the respective communities and localities. This will enable the beginner, as well as others, to purchase black walnut trees with a reasonable assurance that the returns will be a source of satisfaction rather than a disappointment.

It is a real pleasure to come to Urbana and partake of the gracious hospitality of people like Dr. Colby, J. C. McDaniel, and others who have contributed so much to the success of this association. This is a great fraternity and it is my sincere hope that we continue from here to a most successful meeting. This common bond and mutual objective of better nut culture gives us pleasure, profit, pleasant association, healthful enjoyment, and at the same time renders a genuine service to our community and country.

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At this time, we have to make a change in our program, due to the fact that our leader W. W. Magill, of the University of Kentucky, is not here with us. We have asked that S. C. Chandler, of Carbondale, Illinois, speak on the Control of Spittle Bugs on Nut Trees.

Control of Spittle Bugs on Nut Trees

S. C. CHANDLER, *Illinois Natural History Survey, Carbondale, Ill.*

When Dr. Crane spoke about the fact that so many of you grow nuts for pleasure rather than for profit, I thought that probably explained why I just knew about this pecan spittle bug June 27 of this year. I never even heard of it before, although it has been quite serious in and around Union County, 200 miles south of here. The firm which owns the orchard where these tests were conducted, Conrad Casper and Son, has 75 magnificent pecan trees besides an apple and a peach orchard. Mr. Casper didn't say anything about the trouble until then. He lays much of the loss of his crop to the pecan spittle bug. I want you to know what it is like. It is a little out of season. The meadow spittle bug works on grasses and weeds. This is, we have found, a different species. This one I brought up doesn't show as much as it would if I had collected it three weeks ago. There is a little nymph of a sucking insect which spits as it feeds. It doesn't chew tobacco fortunately. I got it from down here in the bottoms of the Little Wabash River.

I first want to tell you a little of what the grower, Mr. Conrad Casper, considers the importance of it. Now, as I say, I don't pretend to be a specialist on nut insects. My work has been mostly with fruit insects. Whatever I know about this insect I have learned this year, and I am just passing on that information to you.

Mr. Casper says that in the year represented by this growth here the spittle bug worked right into the base, and that is the one that would have produced buds. So, instead of bearing nuts, it acts as if you have pruned it. It didn't stop the growth, but it stopped the bearing of nuts. That was attacked by spittle bugs, but at any rate it didn't produce nuts. That has gone on four or five years and his neighbors all say the same thing. Here is one year, two, three, in the twig growth. This year it did make some nuts, in that particular branch. I am not prepared to back everything he says. Here is a growth here, then another, and finally had a few nuts all over the tree. So much then for the importance of it.

My problem was three-fold. I wanted to find out what species was involved. I found out it was not the same species that works on the grasses, and I sent in some adults for identification. They told me the right genus, but couldn't tell me the species. They are either in the process of determining it or on vacation. It is a different thing from the Meadow spittle bug and has two broods instead of one. I wanted to learn something about the life history. All of you know that it is very important to get the life history of the insect, because then you know the stages in which they are most likely to be most easily killed. We know something of the stages and when it would be of use to spray or do something for them. In order to learn the species, I had to rear it out and to attempt some control measures when it was first called to my attention by the farm advisers. This first brood was about over, and I thought our work was about over. The spittle was drying up. It is interesting to note that unless it is actually feeding, you can carry it around in a car for only a short time. The insect seems to stop working and you can't get a very good sample.

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MR. McDANIEL: We have some out there on our pecan trees and on the walnuts also.

MR. CHANDLER: Down there we found where walnut was interplanted with pecan, it would be very light on a walnut then. So I thought that maybe our observations and tests were over before they ever started, but by July 8 or 10, a new brood had started. Dr. G. C. Decker could hardly

believe it. There is only one brood of the Meadow spittle bug with which he was familiar, but this was a different species. It was very much more numerous than the first brood. Ninety-five per cent of the terminals were infested. If that does anything to nut production it is bound to reduce the bearing. Now that brood lasted until late August. The adults continued to emerge for about a month, starting August third, and as far as I know they were still emerging on Sunday afternoon, August 26.

Now, just before telling about that and showing some of the pictures and spraying test, I might wind up this part of it by saying something about the distribution. I wondered if it is in Gallatin County. I found it abundant there. Mac already says we have some in Urbana. I was wondering if it was down in the so-called pecan orchards. These orchards are really just seedling groves. Immense things. I went down there on my way and they do have it. The first man I met said I think we haven't been getting pecans because of that spittle bug. It did seem funny to stumble on the thing. Mr. Casper was really an apple grower. It took him four years to suffer enough to complain about his pecan insects.

I want to show you some slides. Dr. Kelly will start showing the pictures.

I tried to take a picture of one of the worst infested branches. Really, later I found I had taken it a little too soon. This thing actually hangs down in bags.

This was my attempt to show some of these previous year's growth that was killed, and there it was. You can see some of this whitish material here. This was taken after we had sprayed. The new growth is coming through here.

I must have gotten my finger in the way here. This is the dead part and the new growth and something working on it.

Another thing that Mr. Casper says is that sometimes it gets bad enough so that some of these nuts are caused to drop off. They seem to be pretty well established.

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Now there are small things I am attempting to show here. I think our official photographer is on vacation. He has some that are larger than I was able to take. I tried to take a picture when the spittle was dried up, but I don't know whether you can see them.

I wanted to show you some of the cages. They were emergence cages that cover a branch. The nymphs would develop into the adults inside that.

Here again I wished for my official photographer. These are the adults, darkish up here and light in the other end. They are about three-eighths of an inch long and they are a hopper. They have wings with which they can fly, but mostly you see them jumping about. They look like your tree hoppers.

I just wanted you to take a look down this magnificent orchard of Mr. Casper's. He has 75 of those trees. They are 31 years old, planted 55 feet apart. They are 75 feet high. I am going to have to use some of my boy scout ability and measure by proportion. He claims to have sprayed at least the lower three-fourths of the tree.

MEMBER: He uses a speed sprayer, doesn't he?

MR. CHANDLER: No, it's another kind. With all the pressure on one gun, he can get a long way up. One of the materials we used was too strong and we got a crinkling on the leaves. After that he cut it down to what I told him.

My data slide. I want to tell you about this. He sprayed first on July 16 in the orchard which I showed you. He sprayed the whole thing with parathion. He had been using it with his apples and he thought of that as being such a deadly poison that that must be the thing to do. We thought so the first day afterward. He sprayed in the evening. At nine the next morning we could find practically none of those terminals that seemed to have live spittle bugs, but in about two days we could see some were surviving that treatment so we came in again. That spray was applied July 23. At any rate, we sprayed one row with lindane, 1-1/4 lb. per 100 gallons. When I went through the original parathion sprayed plot there was well over half that had some live nymphs.

We started our tests over again. On July 30 we sprayed with lindane (25% wettable powder) with one pound to one hundred gallons of water. Only three terminals with any live nymphs out of a hundred were left in the lindane. The parathion has 38 per cent alive. TEPP which is teta ethyl pyrophosphate is a very quick acting material but doesn't last. Whatever it does, it has to do in an hour or two's time. It has lost its efficiency after that. But we know it might kill everything in a big hurry. There was still ten per cent. We could rule out parathion. We went back to this one row and sprayed on July 23 and on August 2 and 3. That would be nine days. There still were only four infested terminals. That lindane is a refined BHC, which is that material that stinks. It has been known to produce an off flavor in peaches, and it could very easily make an off flavor in pecans. In tests before this on Meadow spittle bugs on crops which might be used for food they did not use BHC, which would be cheaper. There are four or five different forms of the molecule that are important in making that and this gamma is the most important. We used a pound of this 25% gamma lindane and that apparently was the most successful. I didn't get this idea out of a clear sky. I talked to Dr. G. C. Decker and read one or two articles showing where they had been using dieldrin and lindane with the most success.

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I guess that is all the slides now.

MEMBER: Do you get away from the bad effects of BHC by using lindane?

MR. CHANDLER: Yes. Now we feel that at any rate in the very short time in which we have known anything about the thing we have at least learned something about the pest and the distribution and the species and apparently we have got a lead on control. Mr. Casper thinks there is no reason why he shouldn't start in the first brood, although he has had about four years build up of the thing and no wonder it is bad. If we should try that another year, I would say we should start about the middle of June, because when he looked on the 27th of June the show was about over.

MEMBER: Your latitude is about the same as Evansville?

MR. CHANDLER: Yes, Carbondale is almost on the due west line with Henderson, Kentucky, and Anna is 20 miles south of Carbondale.

MEMBER: One hundred miles north would be about two weeks later.

MR. CHANDLER: Yes, I wouldn't be surprised if it wouldn't be later. We thought maybe you might have to spray when the adults were out. We didn't know whether any material would go through that spittle. We thought you might have to spray and envelop the tree when the adults were around.

MEMBER: I saw some spittle bugs in Northern Michigan on wild hazel, and I am wondering if they are a pest on filberts.

MEMBER: We have no damage on filberts and I think we have spittle bugs in St. Louis. Our first brood comes between the first of June and the tenth, and in the last eight years they have been very serious.

MEMBER: Did you say Northern Peninsula of Michigan?

MEMBER: We have reports from Illinois and Missouri and Mr. Armstrong found it over at Princeton, Kentucky, and I know it is in Indiana.

MR. McDANIEL: I have seen some on pecans in Tennessee, but not as abundant as in Union County.

MEMBER: English walnuts in Ohio.

H. F. STOKE: I am in southwestern Virginia. I can say that we have spittle bug in the South. I am not sure it is the same species. When I get it determined, I will let you know.

DR. CHASE: That occurs in all the southern states. It is quite bad in Georgia and Florida and Alabama and in fact all the southern states.

MR. McKAY: It is very bad on weeds and grass in our orchards.

MR. CHANDLER: That's another species.

MR. McKAY: I have never seen any on our nut trees.

MEMBER: Just before this attack on the nut trees it was real bad on clover and grasses in our area.

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MEMBER: That comes a little earlier. We ought to be sure that we get that determined. Dr. Milton W. Sanderson has had to send some specimens to a specialist in this group in Lawrence, Kansas.^[1]

MEMBER: Are there just two broods?

MR. CHANDLER: There might possibly be three. I have another cage in my check block in which I collected the live ones, and I am going to find out whether they produce or don't.

MEMBER: There are two broods in Iowa.

MEMBER: Do I understand the common spittle bug is an enemy to nut trees?

MEMBER: That is for young nursery seedlings.

MR. CHANDLER: Did you see these big trees where I told you about having the crop? I explained for several minutes that there must be two varieties.

MR. FERGUSON: There is a spittle bug that bothers the June berries.

DR. ROHRBACHER: We have a spittle bug we had a year or two in Iowa on the elm trees.

At this time Dr. Colby would like to make a few announcements.

DR. COLBY: I just had a call from Tubby Magill. He is over in Danville and he has burned out a bearing and he is going to get over here for this afternoon. We will have to pinch-hit the rest of the morning.

DR. ROHRBACHER: We will now have a presentation by Dr McKay on the Preliminary Results of the Training of Chinese Chestnut Trees.

FOOTNOTES:

- [1] Dr. Kathleen G. Doering, at the University of Kansas identified the spittle bug from the Illinois pecans as *Clastoptera achatina*, a species not hitherto recognized as an important pecan pest. Spittle bugs from southeastern pecans have been referred to a different species.—Ed.

Preliminary Results from Training Chinese Chestnut Trees to Different Heights of Head

J. W. MCKAY AND H. L. CRANE^[2]

Introduction

Many growers of Chinese chestnut (*Castanea mollissima*) want to know how soon their young trees may be expected to bear their first crops of nuts. This is determined by several factors, but perhaps one of the most important is the amount and kind of pruning the trees receive during the first four or five years they are in the orchard. One reason for the importance of type of pruning is the characteristic habit of the species to form branches low on the trunk, so that low-headed and spreading tops result if trees are left unpruned.

It has long been accepted by most horticulturists that any kind of pruning of fruit trees tends to be a dwarfing process. Hence, pruned trees would be smaller than similar unpruned trees. Pruning of young fruit trees, though reducing the size of the top and the number of growing points, tends to stimulate the growth of the remaining shoots. This has a marked tendency to delay the formation of fruit buds. Hence, unpruned trees come into bearing earlier than even lightly pruned trees. Tufts (2)^[3] reported that lightly pruned deciduous fruit trees, such as apple, pear, apricot, and peach, came into bearing one to three years earlier than similar trees that had been heavily pruned. Crane (1) found that height of head in apple trees had little effect on yield for the first nine years in the orchard, but at the time the experiment was terminated the trees were still too young for him to expect much fruit production. He found, however, that the low-headed trees made more shoot growth and a larger gain in trunk diameter than the high-headed ones, and thus the bearing area was larger. Because the tree form of the horticultural varieties of Chinese chestnut is somewhat comparable to that of apple varieties, it would be expected that the two might give similar growth and yield responses to pruning or training procedures. The experiment described in this paper was initiated for the purpose of determining the response made by trees of Chinese chestnut varieties pruned and trained to three heights of head.

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Experimental Procedure

The three varieties used in the experiment are Meiling, Nanking, and an unnamed variety carried under the accession number 7916. The last variety is characterized by dwarf, heavy-bearing trees that mature their crops very early in the fall, whereas Meiling and Nanking are vigorous, fast-growing varieties that mature their nuts in midseason. In the early spring of 1948 thirty-six two-year-old grafted trees were planted 25 feet apart in the orchard in four short rows of nine trees each. The three treatments consisted of (1) no pruning; (2) pruning to a 2-foot head; and (3) pruning to a 4-foot head. Three trees, one of each variety, were included in a plot or treatment. Thus, the experiment was arranged in a randomized block design with the three treatments randomized in each row and the four rows serving as replications. Each spring the trees received a liberal application of a 10-6-5 fertilizer. Strips six to eight feet wide on each side of the contoured rows received frequent cultivation each growing season, while strips of orchard grass sod were left between the rows to prevent erosion. The soil is Riverdale (tentative series) sandy loam that had been in orchard grass sod for ten years before the experiment was begun. It has been necessary to spray the trees each year with DDT, parathion, or both to control Japanese beetles and mites.

Pruning of the trees was begun during the first winter following the planting in the orchard, but only a few of the lower limbs were removed in order not to dwarf the pruned trees severely. The second winter a few more lower limbs were removed and at this time the two-foot-head treatments were complete. A third pruning was necessary before the heads of the trees in treatment three could be raised to four feet. Detailed records and measurements were made of the diameter of each tree trunk one foot above the ground, and of the weight and number of nuts produced (yield).

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Experimental Results

Table 1. Effects of training to different heights of head on the average diameter of tree trunk and yield of nuts of three varieties of Chinese chestnuts at the end of the third season (1950) after transplanting

Treatment	Average diameter of tree trunk (millimeters)				Yield of nuts (pounds)				Number of nuts			
	Meiling No. 7916		Nanking Tree average		Meiling No. 7916		Nanking Tree average		Meiling No. 7916		Nanking Tree average	
No pruning	43	43*	47	45	.19	.43*	.05	.16	11	22*	2	10
2-foot heads	25	19	21	22	0	.12	0	.04	0	7	0	2
4-foot heads	27	22	25	25	0	.03	0	.01	1	4	0	2

[*] 2 trees missing.

Data on the diameters of the tree trunks and yields of nuts at the end of the third year in the orchard are given in table 1. It should be pointed out first that these grafted trees produced some nuts the third growing season they were in the orchard. This is very much earlier than seedling trees ordinarily could be expected to bear nuts. It will be noted that trees of Number 7916 developed a somewhat smaller trunk on the average than the other varieties did, but Number 7916 outyielded them about two to one, both in weight and in number of nuts produced. The tendency of Number 7916 to bear nuts earlier and on smaller trees than other varieties may prove to be a valuable characteristic that will justify naming and releasing this clone as a new variety. The fact that it matures its nuts early may also make it suitable for growing in more northerly areas than other varieties, because the length of season required for maturing the crop presumably is shorter than for other varieties. However, this cannot be determined without extensive tests in the North, which are now being made by a number of growers.

It will be noted also in table 1 that the trunk diameters of the unpruned trees were about twice as great as were those of trees trained to two-and four-foot heads; and furthermore, the yield of nuts was more than four times as great. This means that cutting off the limbs that formed below the 2-foot level checked growth so that the bearing surface of the tops was greatly reduced as compared with that of unpruned trees. Also, growth of the tops of these trees was etiolated and spindly, and the shoots produced few or no catkins as compared with the abundant catkins produced by the unpruned trees. Several of the trees with four-foot heads became so top-heavy that staking was necessary, and nearly all the pruned trees leaned to some extent. At the end of the third year in the orchard, the unpruned trees were much taller than trees headed at two and four feet, and the spread of branches was also much greater. Preliminary results from this experiment indicate that early pruning of young Chinese chestnut trees causes severe dwarfing and consequent delay in the formation of catkins and the bearing of nuts. All pruning operations should, therefore, be delayed until the trees reach bearing age, and from that time on low limbs may be removed gradually from year to year until the trees are trained to the proper height.

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Discussion

MR. McDANIEL: What age and height were these trees when planted?

DR. McKAY: These trees were grafted on two year old stock and allowed to grow a year. They were three years old. They have grown in the orchard three years, so they are now six years old and about five feet high.

They were grafted about a foot from the ground and they grew three feet or so. They were a good size grafted tree.

MEMBER: May I ask the time of the year when you pruned?

DR. McKAY: In the dormant season.

MR. SHERMAN: I have been pruning some Persian walnuts. Just as the side branch starts I rub that bud off and I can't see that I am dwarfing it any.

MEMBER: Maybe you aren't pruning enough to do any dwarfing. We have removed whole limbs.

MEMBER: I have taken it off and allowed the center to go up.

DR. McKAY: It may have different effects. We actually removed wood from the tree.

MEMBER: Is that 7916 a pretty good sized nut?

DR. McKAY: It is a smaller nut. The 7916 is a potentially high bearer. It bears quickly after it is planted and that is one of the things a lot of us are interested in.

MEMBER: How about eating quality?

DR. McKAY: It is just as good.

Our preliminary conclusion is that early pruning in this species causes severe dwarfing and delay in the fruiting of Chinese chestnuts. Just let them alone. Plant them and forget about pruning them until they come into bearing. Let them alone and you will get nuts two or three years sooner than if you start taking those lower limbs off. Once you get it into bearing then start in and take off a few limbs on the bottom. You could still over-do the thing. The point is to wait at least three or four years. We will have some recommendations in another year when we shall know more ourselves.

MEMBER: What do you disinfect those cuts with?

DR. McKAY: We don't figure it is necessary to be too particular about painting the wounds. Those wounds heal over very quickly. Use an asphalt tree wound compound. [Pg 26]

MR. SILVIS: Personally it appears to me that Walter Sherman's method of rubbing off the buds or very young shoots just as they start growth is to be preferred. Your method of cutting off limbs is destructive pruning. Though you say pruning dwarfs the tree, actually the root is still there and given enough time will not the tree recover?

DR. CRANE: I carried on pruning experiments for many, many years, with apples, peaches, pears and cherries. Since then I have been working on nut trees. As for this debudding, the reason he doesn't know he was injuring, was that he didn't have checks and experiments. When you have, you will see that debudding or even pinching the terminals will actually dwarf the tree, although not as badly if it is not done in the summer time. If you do it in the springtime, and if you keep on debudding along in June and July, you are dwarfing your trees.

MR. McDANIEL: In the University orchard you will see some Chinese chestnuts which have been pruned heavily, and the results aren't good.

MR. CORSAN: I visited a sweet chestnut orchard in Michigan, and the grower told me that there were two types of Chinese chestnut trees, one that grew tall and the other squatty. The one that grew shorter was much later than the tall one. Then I would like to tell you about an experience I had years ago. I imported from this state of Illinois from Miss Amelia Riehl, and I also planted about a bushel of seed of Chinese chestnut trees grown in the Niagara district. These Niagara seedlings are quite large and the amazing thing is they didn't grow any nuts. So I came across another orchard in the Niagara district where they were growing that large pointed type of nut and I got some grafts from that and I put them on these non-bearing trees and they all took at once. A bunch of them would all grow up without any failure. That was easy and now they are growing fine. I just thought I would tell you that peculiar experience, and that knocked me cold. The trees from Illinois and the trees from the seeds of the large good sized nuts were equally good.

MEMBER: Did they bear after you grafted them?

MR. CORSAN: They sent out sprouts that far. [Indicating.] The trees were all right.

MR. STOKE: I think you are both wrong. I think you will take the tree and plant it without pruning and then it starts and then in the summer after it is in full leaf pinch off the leader in the lower branches. That will retain the value of those lower leaves. By doing that and suppressing the lower you will get better results than either of the other ways. Nature will remove and make unfruitful the lower ones. You can help nature in forcing the upper growth and removing the lower.

DR. McKAY: That is one way of doing it. A lot of people want to get ahead of nature. If you wait for those lower limbs to die, the tree will have to be pretty large. Lots of people want to get under their trees before that. You sometimes want to get there after three or four years. I think it would take ten years for the shade to do it. [Pg 27]

MR. STOKE: I didn't mean to let the shade do it. We after three or four years can remove the limbs ourselves with less shock and much better results. That will work on any tree.

DR. McKAY: I don't see how you can remove.

MEMBER: You force stronger leaders at the top and hasten the growth of the top.

MEMBER: You will get a delay of fruiting.

MEMBER: I think you make up for it.

DR. CRANE: That may be true. We have seen very conclusively that when you prune even a little you are going to destroy fruiting.

MR. STOKE: You will have a larger tree in five years by my method than by yours.

MR. A. M. WHITFORD: I have trees of that very spreading type of Chinese chestnut, that are lying on the ground and I should have removed those limbs five or eight years ago. You should

remove them in not more than five years after planting.

DR. McKAY: I want to make a comment. Some grafted trees are not bearing. This to us shows the importance of varieties. This difference between 7916 and the two others is so striking it means in the future we have to pay more attention to the varieties. There is no question that some varieties will bear sooner than others. We have to talk about grafted trees because that is the only thing that can be developed. Every grafted tree is potentially like every other of the same variety.

MEMBER: What factors suppress them? In pinching back, do you mean that the actual growth rate is changed, or that debudding will suppress the entire tree?

DR. McKAY: We mean the amount of the top itself. Usually it is the spread and the height together. When you prune, you tend to hold back the total amount of the fruiting area of the tree. If you allow it to develop untouched you have a greater fruiting area.

MEMBER: The chestnut tree often will sprout from the trunk. What are the processes to check that?

DR. CRANE: It is very largely root pressure. When you have a tree that is uninjured, all of your water and soluble minerals are going up to the top. When you have the tree trunk killed or cut off you still have water in your root system. In some trees you have a lot of adventitious buds that are still there and never forced out. Nitrogen will force those dormant buds into growth. At each walnut node or leaf we have as many as seven buds, all of which are capable of producing growth. Normally it is only the major bud that grows, but propagators sometimes get a patch bud back to life even though the primary bud dries up. Keep on forcing it and you are bound to get a sprout out of that bud. That is just the way it is with a lot of dormant buds. There are so many that when we cut off the top these dormant buds are forced into growth. Some trees don't have them. Tung does not form dormant buds, but will form those adventitious buds. They will form numerous buds even in a very small area of callus. It is just a safeguard that some plants have developed to keep the individuals alive.

MR. McDANIEL: I think what Mr. Craig had in mind was the tendency there is in Chinese chestnut to form multiple trunks.

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DR. CRANE: That is due to these dormant buds and the ability to produce callus. Chestnut is one of the species that produces abundant callus very readily. That is one of the reasons this Chinese chestnut is so blight resistant. When it has an injury it will form callus at the point of the injury.

MEMBER: Would you tell me how you would start a blind bud growing. It will not break. It doesn't form. When I come to a wood which is blind I cut it off.

MR. CHASE: We have had such buds and find if that bud is blind you can force all you want to but you won't get any new buds to grow from that bud patch.

DR. McKAY: It does on two-year wood. Perhaps on one-year wood you have no adventitious buds. When the bud dies, that patch is through. On two-year wood frequently small adventitious buds will grow.

MEMBER: If you rub the main bud off, it will start on the side.

MEMBER: Do you recommend two year wood for budding?

DR. McKAY: We recommend one year if it is large and vigorous. If you have to use chestnut wood smaller than a pencil the results will be indifferent.

MEMBER: What time do you recommend budding?

DR. McKAY: We graft in spring, the first week in May, using dormant wood the size of your little finger. We wait until the first leaves are open, usually in May.

MEMBER: Do I understand that most any place along that tree trunk there are adventitious buds?

DR. McKAY: Particularly next to the root.

MEMBER: Have you had any success in bench grafting of the chestnuts?

DR. McKAY: We have had some success and other times failures. We can't recommend bench grafting. Perhaps you can do it, but we haven't yet worked out a satisfactory method.

MEMBER: Wouldn't it do better if you dipped the top in paraffin or something?

DR. McKAY: Ask Mr. Bernath. He is the authority.

MR. BERNATH: No, none whatever. No, it wouldn't help.

MR. CORSAN: In New York they had weevils. That is the most terrible thing I ever saw. Has the weevil disappeared entirely?

MEMBER: No, indeed, we have weevils over a large area. It is a very important pest in the East and in the Ozark Chinkapin range around chestnut plantings. There is a very satisfactory and easy way of control. DDT, two pounds per 100 gallons of spray solution or a dust of one per cent.

The trees are sprayed once or twice or three times from about the last of August on until shortly before harvest.

MR. McDANIEL: That is discussed in last year's annual report.

MR. CORSAN: I fumigated my seed nuts for the weevils and killed them all effectively, and we have no weevils of hickory or chestnuts now. That is, as far as southern Canada is concerned. It would matter terribly if we had any weevils of any kind. Anyone hear about the hickory and chestnut weevil?

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MEMBER: Standard directions are available for the control of weevils both in chestnut and hickories.

MEMBER: There are practically no weevils in New York. The boundary line would be about southern New Jersey. It doesn't make much progress farther north. It's also absent toward the Southeastern and Gulf coasts.

MEMBER: That is an interesting discussion, but it is off the current subject.

DR. ROHRBACHER: I am sure your project is interesting, manifested by the questions you have been asked.

FOOTNOTES:

- [2] Horticulturist and Principal Horticulturist, respectively. U. S. Department of Agriculture, Bureau Plant Industry, Soils and Agricultural Engineering, Beltsville, Md.
- [3] Number in parenthesis refer to literature cited, [p. 25](#).

The Filbert and Persian Walnut in Indiana

W. B. WARD, *Department of Horticulture, Purdue University*

The soils and climatic conditions in Indiana are, for the most part, favorable to the growing of nut trees. There are various types of soils, ranging from light sand to heavy clay, soils high and low in organic material and natural fertility. The annual rainfall, 35 to 40 inches, is fairly well distributed throughout the year. The length of the growing season is about 150 frost-free days and, oftentimes, another 20 to 30 days of non-killing temperature. The summer and winter temperatures are average, thus providing good conditions for the development of fruit and growth to the trees.

There are always exceptions to the normal conditions, and a good test season broadens the experience of those who want to go to the extreme in planting nut trees. This past year, 1950-51 season, was a good test year. The temperature early in November was as high as 85°, tomatoes, peppers, beans, and sweet corn were growing in the gardens. During mid-November the temperature quickly dropped to near zero. The cold later went down to -20° and even -35°, as recorded at Greensburg. This cold weather, not only killed much of the tender short growth and pistillate flower possibilities, but destroyed many of the catkins. The filbert and Persian (including Carpathian) walnuts, suffered and in some instances the plants were killed to ground level. All of the damaged plants have survived, and where the top of the tree was killed, new growth came up from the root. As only seedling Persian walnut trees were under observation and included in the Purdue plantation, their sucker growth will be used to form new tops.

The native walnut, hazelnut, hickory, and butternut had little or no winter injury and many trees are very fruitful all over Indiana. The improved strains of filberts and the Persian walnuts have only a few fruits this year. Seedling Persians grafted or budded on native black walnut survived, but there was some damage to the top growth due to immaturity of the wood and bud last fall. Before general planting recommendations can be made, other than for the hobbyist or home-owner with a few trees, further testing will be required.

Filbert and Hazelnut

The native hazelnut thickets are not as common now as in years past. Most of the nuts were small and of little commercial value. When hybridizers and other nut enthusiasts started improving the size and quality of the native hazelnut and bringing in filberts from other countries, some impetus was added to the filbert planting program. Only a few took advantage of these new and promising seedlings, and aside from a few small plantings throughout the state the filbert is placed in the ornamental grouping of plants. Several areas in Indiana are suitable for more extensive plantings. The Jones hybrids have proven satisfactory and are found growing from the northern part to the Ohio River.

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Several crosses were made four years ago using pollen from the Rush and large fruited seedlings on the native hazel. There are 35 or 40 such plants, two years old, now growing in the Purdue plot. They came through the winter in excellent condition. Many of the catkins on the older plants

were killed during the early cold spell, and the nut crop this year is very spotty. The filbert does have a place around the home as an ornamental, as a fruit tree, or when used as a hedge for screening.

The Carpathian Persian Walnut

The Carpathian Persian walnuts in Indiana are practically all seedlings. Many of these seedling trees show great promise, while others under observation for the past few years are being discarded because of lack of hardiness and production. Some few seedlings made vigorous growth and produced fair to good yields for the past 10 years, but some weakness was evident after the 1950-51 winter. It appears now that those trees that have survived and are in production this year are worthy of further study and propagation.

The oldest known Persian walnut in our state is the Haderle seedling. A few nuts, from a friend in California, were planted in 1924 and 10 years later fruited. This tree has produced as many as 350 pounds of nuts in a single year and has survived all test winters since planting. The nut from the Haderle tree averages 32 nuts per pound, medium shell, good quality and 44.6 per cent of the total weight is edible. The nut cracks well. Several other such Persian seedlings have been classified as existing prior to the general distribution of Carpathian nuts from the Wisconsin Horticultural Society in 1936 to 1938 and later.

Several individuals in Indiana took advantage of the nut sale and importation from Poland during the years mentioned and about 10 per cent of the original seedlings are now alive. Many of the trees planted 10 to 15 years ago are fruiting and classified. Outstanding groups of seedlings, which are referred to by name, such as Bolten, Fateley, Eagles, Barnhart, Kraning, Behr, Zollman, and others are found from the extreme northern area to the Ohio River, and are distributed over nearly one-half of the 92 counties in Indiana.

The use of eastern black walnut as understock has been practised by several orchardists and nurserymen, and a few will have trees for sale in the near future. The fruits from these trees compare with the best.

The largest nut is in the Fateley #1., with some fruits two inches in diameter, and averaging 23 nuts per pound. The nut is high in quality, has an appealing taste, and a well formed kernel. It cracks easily and has a very thin shell for such a large nut. This tree has borne 50 pounds of nuts or more annually for the past few years and has a nice crop this year after the severe test winter. The Fateley #1 seedling as well as the #2, #3 and #4 seedlings, are grown on a city lot, under crowded conditions and provided with only moderate care.

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Several crosses have been made at Purdue with the Persian walnut, and approximately 100 seedlings have been distributed to various persons throughout a large area of the state. The trees do not seem as susceptible to insect and disease damage as the native black walnut, and growing well in sod should make good lawn trees. Some of the nut trees were sprayed with "Nu Green"—five pounds per 100 gallons of spray material was used on the orchard crops, and great growth response was noted for the sprayed over unsprayed trees. As the home owner is forever looking for new trees to plant, and trees with clean habits, the Persian and particularly the Carpathian selections may be the answer.

The speaker exhibited photographs to illustrate his talk. They pictured several of the different trees he had mentioned. The photographs showed the conditions under which the trees grew, the effects of fertilizing, and the injuries resulting from the winter cold. The reading of the paper was followed by a short discussion, after which Dr. Rohrbacher called upon Mr. Ira Kyhl, of Sabula, Iowa, who talked on the subject "Nut Growing in Eastern Iowa."

Nut Growing in Eastern Iowa

IRA KYHL, *Sabula, Iowa*

About five years ago, I became very much interested in nut trees and having hundreds of wild black walnuts and hickories I attempted to graft, or rather top work, the black walnuts to Persian walnuts and heartnuts, and the hickories to pecans and hicans.

My favorite, of course, is the Persian walnut, and in addition to top working them on blacks I planted several grafted trees and several hundred seed nuts. To my surprise and pleasure, nearly every seed grew and the seedlings are still doing very well. I now have 35 to 40 varieties.

I have had very little winter injury, except with the Broadview variety. The tops froze back a little and I had a little trouble with the bark splitting on the larger trees. I covered the splits with tree wound dressing and they are all doing well now. I consider the Schafer about the best and most promising variety I have and the grafts take very well. Most of the Carpathian varieties are also growing nicely and especially the Illinois number 10,^[4] which is a very rapid grower.

In top working, I use the bark slot method, usually setting two to three grafts on a three inch stock, as at least one scion is almost sure to start. These scions are fitted and nailed in place with a seven-eighth or one inch nail and then well wrapped with one-inch industrial adhesive tape. This seems to break or deteriorate with the growth of the graft. I then thoroughly wax the taped part as well as all of the scion, covering the buds rather lightly. After the scion has started to grow well, a one by one strip is nailed to the stock. This extends from two to three feet above the top of the stock. The growth is then tied to the stick with soft cord. If growths are not tied this way, most of them are broken off by the wind. After the grafts are set, I cover with a paper milk bottle, or rather, container, and cut four small holes in it for ventilation. It sheds the rain well. I use a small tack on two sides. The containers usually stay there until removed when the graft starts. This method works much better than paper bags, as they are easily water-soaked and the wind blows them against the scion, which is easily loosened and therefore fails to start.

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I am also well pleased with the results I have had with heartnuts on black walnuts. I consider them the most rapid-growing of any of the nut trees. I have had grafts bear a few nuts the next year after being set. I now have seven or eight varieties, of which I consider Fodermaier, Aloka, Rival, Mitchell, and Wright as the most promising, along with Goettler. Squirrels seem to prefer heartnuts to all other sorts. I have eliminated this trouble by tacking a length or two of stove pipe around the trees.

Last summer my attention was called to a tree about 30 miles from my home, which bore a very large crop of heartnuts. The man that owned the tree called them filberts. The tree is about 40 feet tall with a spread of 40 or 50 feet and is 18 inches in diameter. It is perhaps 20 to 25 years old and bears from three to four bushels a year, I am told. I have heard that the tree grew from a seed brought over from Germany. I have named the tree Goettler, in honor of the man bringing it to my attention. The nut seems to resemble the Wright and is one of the best cracking nuts I have found. I received permission to get scion wood from the tree and have a few grafts growing well.

Hickories are, of course, a native of this section as is pecan, which grows wild on the Mississippi River bottoms about as far north as the mouth of the Maquoketa River. The pecan grafts take off nicely on hickory stocks but the graft seems to outgrow the stock. I have found, however, that hican, being half hickory and half pecan, works much better on a hickory stock. My pecan grafts which seem the most promising are Major, Indiana and Greenriver, and of the hican grafts the Burlington and Wapello.

Chestnuts seem to do very well here, as well as filberts and native hazels. Of the chestnut varieties I have growing I prefer the Nanking, Kuling and Meiling. Most of my Persian walnut plantings I have interplanted with dwarf fruit trees and have clover and alfalfa growing between the rows. This is cut twice a year and used for mulch. The following spring it is spaded in and a small amount of high test nitrogen applied at the same time and the trees all seem to respond to this treatment very well.

DR. ROHRBACHER: Any questions or remarks?

MEMBER: Mr. Kyhl mentioned the Schafer. That is the one for the boys and girls in a hurry to get nuts. In three years you get nuts. I have experimented with it and that is the only tree that will do it.

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MR. CORSAN: I would like to ask the convention if they have had the experience with the black walnut and the Persian. Down the valley would come a good strong wind and break off the tops. I had one that grew 20 feet from a little graft. When I put this on, it had three buds. One bud threw six feet and 20 feet of wood from that one seeding. I barricaded it so the ice wouldn't break it. The ice broke through my barricade and I have one that is growing as high as I can reach. Black walnut broke off with the wind. Sometime, the whole tree broke down. Not a twig was broken off the English walnut. The black walnuts worry me to pieces.

MR. DAVIDSON: In connection with this rapid growth, is there any difference in the quality of the wood? We have some that grow so much more rapidly. When the wood matures, will it have the same value for furniture and so on as the slower growing ones? Would they be more like the softwood?

MR. CRANE: Our highest grade native woods are those which grow more slowly. We haven't made any studies on the wood in black walnut, in relation to the growth rate.

DR. MacDANIELS: The strength and value of the wood depends on the proportion of large and small cells. In a very slow-growing tree you have a large proportion of the big cells. In rapid-growing wood you also have an undesirable result. It is between the very slow and very rapid that you get the best. If you get a rapid growth the cells are thin, even though they may be small. It is the in-between condition that makes for good timber. That is based on actual strength tests and evaluation.

MEMBER: Mr. Corsan wrote me about the wind damage. I never had that experience. I saw the cyclone in southeastern Iowa. Elms were up-rooted and torn to pieces and I didn't see any black walnut damage. Even the hickories were damaged and some snapped off. I have never seen any walnut give away.

MR. McDANIEL: We have wind damage in Urbana, and we can show you some places where black walnut trees were removed.

MR. CORSAN: Many years ago I was in a train going from Toronto to Montreal, and this is a section that is full of hickory trees. The Indians must have planted them. That is the only nut except butternut. I looked out the window and we had a six-inch ice storm and the oaks were stripped. Most of the other soft trees were down to the ground. There wasn't even a twig killed on the hickories. The shagbark hickory. They were just as sound.

DR. ROHRBACHER: The ladies who want to take a little walk and end up at Mrs. Colby's home where she is going to serve hot coffee meet at 1.30 in the main lobby. This is the regular time on which you are eating and sleeping now. The remainder of the group will meet here at one o'clock. If we go down to the cafeteria and get in before 11:40 we have a better chance.

FOOTNOTES:

[4] Now named Colby, this variety is a seedling of Crath No. 10.—ED.

TUESDAY AFTERNOON SESSION

(meeting called to order at 1:00)

DR. ROHRBACHER: We will have the secretary's report.

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MR. McDANIEL: By count last Saturday, we had 568 paid members plus 21 subscribers—a total of 589, compared with 575 members and a total list of 596 a year ago and 653 in 1949. Maybe you need a new secretary who is a more successful salesman, to push the membership higher. Actually we still have more members than at any time before the late 1940's, but we need more salesmanship to double or triple the present number. The planting of hardy named nut trees is going up by leaps and bounds (ask any nut nurseryman) but membership in the leading organization to promote their culture is lagging. We need more members among the new nut planters, and I think we have plenty to offer them for their \$3.00, but we are not getting the point over to enough of them. There are thousands that we helped to get started. If anyone has some new ideas on the subject, let him speak up in the discussion period, and we will try to put the ideas into operation if they don't cost too much—in money or time of the organization's officers.

Ohio still has the most members, and I think we can say the Ohio group is the most closely knit and active one in any state at present. There are 82 members in Ohio now. Several of them are new ones. Ohio is keeping up its membership percentage and it is always well represented at the meeting. How many here from Ohio today? Not *quite* half the group.

It is nip and tuck between New York and Pennsylvania for membership down through the years. This year Pennsylvania is one man ahead of New York, unless George Salzer has brought another new member's name with him. Pennsylvania is 58, New York 57. Two years ago it was New York 62, Pennsylvania 57. Then we had the meeting in New York state last year. Maybe some of the New Yorkers took a good look at us and decided it wasn't the crowd they wanted to be associated with! We haven't met in Pennsylvania recently, so the membership there is very steady. Dr. Colwell moved back home from Ecuador, so Pennsylvania moves from 57 to 58 members.

Will the members from these two states rise briefly? Pennsylvania first—at least three from Pennsylvania; then New York—three from New York State.

I might say the decline in New York members is *not* in the Rochester area. Mr. Salzer is seeing to it that they don't drop out in Western New York. A lady in his county won our \$25.00 first prize for her Persian walnut, and George relieved her of \$3.00 of it for 1952 dues. We need more members like Mr. Salzer, and Mrs. Metcalfe, too.

Illinois is fourth now with 38 members. I don't know what it'll drop to after this meeting. One member changed his address from Chicago to Indiana, but we are still seven up from the 31 of two years ago. Maybe Illinois is going to become a nut growing state after all, in spite of oak wilt, walnut bunch, spittle bugs, and the 1950 Thanksgiving freeze.

Will the Illinois people rise, both members and visitors? Not quite a fourth of the group is from Illinois.

Michigan is still fifth—32 members now, 30 in 1949. Take a bow, all you Michiganders—five or six from Michigan. We could afford to take a chance on a meeting there again before long.

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Indiana is going up slowly in membership. It is now sixth with 27, supplanting Tennessee. It had 18 members in 1947 and 25 in 1949. How many Hoosiers here? Six or seven from Indiana.

Canada has 26 members listed now, putting it seventh. (There were 26 in 1949 also). Who's here from Canada—at least two.

Iowa is one of only two other states with more than 20 members, having 22 in the book now, compared with 26 two years ago and 30 in 1947. How many Iowans here?—three besides our President.

New Jersey has 21, Massachusetts has 17, Tennessee has 16, Virginia and Washington 14 each, Missouri, 13, California and Maryland 12 each, Connecticut and Oklahoma, 11 each, Kentucky and Kansas 10 each, West Virginia 8 and Georgia 5. There are fewer than five each in all the other states, except seven states with no members. Arkansas is a good nut producing state, but membership dropped from four to none. There are no members and seldom have been in Arizona, Colorado,^[5] Maine, Montana, Nevada, and Wyoming. I believe we never had one in either Arizona or Nevada, but the others have occasionally had one.

Hong Kong is a new territory on our list of foreign members, though Mr. Wang, who now lives there, joined the NNGA from China around 30 years ago.

We are a *little* better off on the annual report now than we were a year ago. It is printed and members who are here can take their copies. The story is the same as usual with the printers, although they are new ones this time. Our job got behind some others which moved slowly and then was put aside for work on school annuals in which this company does a lot of business. With some more volunteer editorial assistants and proof readers maybe we can get the copy to the printers earlier, so as really to get the book printed in the winter I agree with all the members who said that a year between the meeting and the publication is too long.

Looking toward this the November 1 cut-off for accepting papers should still apply, with the suggested addition that no long ones will be accepted which were not read at the meeting. Composition is too expensive to permit publication of a book with unnecessary wordage, so I hope we can avoid as much as possible the duplication of material which appeared in recent reports. Boil it down, and please, for the sake of the editor's eyesight, don't try to put too much on a page. The editors appreciate some space between the lines. But if you have something new to report, don't hesitate to send it in.

The 1950 report is here. I think it's a good one. In the hope of having a still better one for this meeting, I'll stop now.

DR. ROHRBACHER: Thank you for your report. Any discussion and criticism both destructive and constructive?

MEMBER: I thought this 1951 circular of information was a handy thing to have. I was wondering if more are available.

MR. McDANIEL: Yes, we run off a surplus each year and any member may have more upon request.

MEMBER: If you were to mail two instead of one to each member, that member could give the extra copy to a prospective member.

MEMBER: I would like to make a suggestion on that card business. Why not follow the system of the *National Geographic's* recommendation card—you can't become a Geographic Society member any other way.

MR. McDANIEL: We will put a card or blank for nominations of members in the next issue of the *Nutshell*.

DR. ROHRBACHER: This is the time the secretary would like to have comments on this to give him help if he gets his job back.

MEMBER: It seems to me it would be a help in not only attracting new members but a help in stimulating attendance in our meetings if the annual report of the preceeding meeting could be gotten out something like two months ahead of the following meeting.

MR. McDANIEL: I believe we can do better than that this year.

MR. DAVIDSON: I do think it has quite an influence in stimulating interest not only on the part of our members but stimulating attendance at our meeting. I do think also that the suggestion of following the example of the *National Geographic* should be put in the form of a motion and the Secretary instructed to remind each member to please nominate his or her friends for membership in the Association. I would be glad to make that motion.

DR. ROHRBACHER: Do I hear it seconded? (Motion seconded). It has been moved by Mr. Davidson and seconded by Mr. Wallick from Indiana that we carry through this new project of securing membership. Any further discussion?

MEMBER: Please repeat the motion.

MR. DAVIDSON: I would move then that the secretary be instructed to send to each member a reminder of his duty to nominate friends for membership in this Association.

MEMBER: What do you mean by membership—members or officers?

MR. McDANIEL: Members first, officers later. If you stay a member long enough you probably get to be an officer.

MEMBER: I'd like to amend that resolution that the secretary send a card to each member in which he can nominate a new member. With the secretary just reminding the members nothing ever happens. I think the card has to go with the reminder.

MR. DAVIDSON: I accept that amendment.

MEMBER: I think this whole thing clarifies itself if you bear in mind that the application form and the nomination are one and the same thing. A card which says in effect "I apply for membership in the NNGA" and the blank for his name, occupation and address. The card says that remittance of the annual dues is made herewith and this applicant has been nominated by the current member of the Association. It is one card. I receive a couple of these from the secretary and write my name for a nominee. His name and address and that is sent in to the treasurer together with his dues and an application of someone who has been nominated. It is a good screening because you have people interested definitely in the work of this organization.

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MEMBER: I would fear that too many barriers put in the way of it might tend to decrease the number of new members. It is hard enough to get people interested.

MEMBER: Mr. President, I don't see how that can be a barrier since one doesn't know unless a member tells him. One doesn't become a member until a member said "Look, you should belong, let me nominate you for membership."

DR. ROHRBACHER: If I want to become a member, this is just another source.

MEMBER: The *National Geographic* psychology is good. They have a circulation of one million, seven hundred thousand. If you want the *National Geographic*, some member has to sign a card. The psychology of that is that it makes it a little hard to get in and it works.

MR. RUMMEL: If there is a motion on the floor, I will second the amendment.

DR. ROHRBACHER: All in favor say "aye"—opposed "no". Motion carried.

Is there anything further to take up under the heading of helping our secretary? If not, we will go on and have a report from our treasurer.

FOOTNOTES:

[5] A Colorado walnut grower joined later.—Ed.

Treasurer's Report

MR. SMITH: Ladies and gentlemen of the NNGA, our good secretary awhile ago made the remark that perhaps he wasn't a very good salesman. Perhaps it is more the treasurer's fault for not being a good collector. The treasurer's report for August 26, 1940 to August 25, 1941. Annual membership dues—\$1655.00. Among these there are two contributing members, Arp Nursery and Mr. Howard Thompson. I have two sustaining members, Mrs. Herbert Negus and Mr. Alfred Szego. Sale of Reports—\$240.51; Interest on U. S. bonds—\$37.50; contributions toward the rental of the hall—\$47.25; contributions for the Persian walnut contest \$35. I had hoped that some other states would come forward, but they didn't. Total receipts—\$2,015.26.

Disbursements: Rich Printing Company for the 1949 annual report, \$1,529.26, including the mailing and envelope charges and also the cost of printing. *American Fruit Grower* subscriptions—\$221.20; supplies—\$65.38; Secretary's 50 cent per member—\$270.00; secretary's expenses—\$37.49; treasurer's expense—\$96.37. My expenses rose due to the fact I sent out two notices that dues were due. The two years previously I had depended upon *The Nutshell* to let the members know and a lot of the members don't read the notice. The editor had it up there in the front lines, but it didn't bring them in too well. That made the postage bill \$37 more than it was the year before. Prizes for the Persian walnut contest—\$75.00; rent of hall, \$60.00. You will notice above the rent was more of a donation. They gave us strong hints that is what they wanted. G. R. Grubb and Company \$47.25 for cuts for the annual report you just got. We owe \$19.00 on the cut that appears on the front cover. 1000 copies of *Ford Times*—\$10.00. This is their March, 1951 issue with Dr. J. Russell Smith's color-illustrated article.

MR. McDANIEL: I told you about it in *The Nutshell* and I have ten or more requests. I still have a large stack and will try to bring some over. [Still available for 3¢ stamp at the secretary's office.]

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MR. SMITH: Membership affiliation with American Horticultural Society—\$5.00; Bank service charges—\$1.72; Miscellaneous—\$16.50; Total—\$4,320.93. Cash on deposit as of the present time—\$1,730.99. There are still a couple of checks outstanding. One was for a walnut prize winner. He probably just framed his check. He has had it over a month. We have \$1.97 in petty cash on hand. Disbursements of \$2,587.97. Total on hand—\$4,320.93. On hand August 26, 1950—\$2,305.67; the receipts this year to August 25, 1951—\$2,015.26 which makes the total of \$4,320.93. U. S. bonds—\$3,000.

DR. ROHRBACHER: Thank you, Mr. Treasurer.

MEMBER: I'd like to speak about the pamphlet from the Ford people, an article by Smith, very interesting. I believe the secretary said he has a number of copies in his possession. It is well worth having.

DR. ROHRBACHER: I think the treasurer will welcome a vote of thanks for his report and work. I move his report be accepted with thanks for his work. It has been moved and seconded that we offer a vote of acceptance and thanks for this report. So passed.

MEMBER: Mr. O'Rourke has a report and he has a pamphlet. He would like each of you to have a copy to read and study, so when he comes on the program it will save a lot of time if you read this pamphlet which he has provided.

MR. SILVIS: As chairman of the auditing committee, I find two discrepancies in the report issued by Sterling Smith. The checks that are uncashed of course I don't believe are found, and while the cash seems to be going down, in the face of mounting printing costs and mailing costs, this committee in auditing the books believe they are in good shape.

DR. ROHRBACHER: Thank you. Shall we have a motion?

(Motion made, seconded and passed)

I have appointed Dr. Crane on the Resolutions Committee. At this time we will go along with our program.

MEMBER: Mr. Chairman, I believe that a report on our constitution and by-laws provide that the nominating committee must make a report on the first day of the meetings. Now, I am not sure about that.

MR. McDANIEL: The nominating committee doesn't have the legal number of members. We overlooked a careful reading of the constitution and it should have five instead of three. I think the constitution says it has to report on the first day.

DR. ROHRBACHER: Is the committee ready to report?

MR. CRANE: I think the nominating committee makes its report as to the slate of officers that they suggest for the next year. However, the election of the officers takes place at the closing sessions. That is in order to give the membership the opportunity to study the recommendations. Nominations for any office may be presented from the floor now or immediately preceding the election, if you disagree with the choice, so you have an opportunity to present additional nominations just before the election takes place.

Mr. President, the nominating committee desires to nominate our Dr. L. H. MacDaniels to be our president for the coming year. And for vice president, Mr. Richard Best of Eldred, Illinois. Our very loyal, faithful, hardworking secretary has agreed to fill the post for another year again, so we will nominate J. C. McDaniel to that position. I am sorry to say our present treasurer has asked and insisted upon being relieved from his duties, so the nominating committee has reluctantly agreed to that, feeling that we should not work an officer too long and too hard. We ought to pass these things around, and we now take Carl F. Prell of South Bend, who has kindly agreed to serve. This, Mr. President, is the report of the nominating committee.

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DR. ROHRBACHER: Thank you, Mr. Crane. This board looks very good. Understand that it is open for any further nominations from the floor at any time, either now or preceding the election. If you wish to present any other names to this list, you may do so at our meeting tomorrow evening.

Mr. Best, we haven't heard about your problem, about your project. Before we make this trip I think we should have a little response.

MR. BEST: You want me to tell you what the trip consists of at Eldred. After getting through with the Persian walnuts at Royal's, we will proceed down the Illinois River about 30 miles to our place at Eldred. We are along the Illinois River. We have a large planting of all the nuts we can think of, but what we are particularly interested in showing you folks is our pecan trees, 5,000 pecan trees. Those are grafted varieties. We have 47 varieties. We are doing some work with seedlings. We have taken Mr. Wilkinson's Major and Greenriver and then a few of the hickory-pecan hybrids and we have planted nuts with the idea we will grow those nuts and let them bear. We will exhaust all the possibilities. This year we have treated a number of seedlings with colchicine. We don't plan to show you very much of anything but pecans. We do have some Persian walnuts.

We should have some notice for reservations. Everyone who has written to us we have taken care of in the best possible way. If any more of you want to come, be sure and let us know so we can handle that.

Status of the Northern Pecan

W. W. MAGILL, University of Kentucky, Leader of Discussion

MR. MAGILL: I offer no apologies for being late. My car broke down. Mr. Armstrong is with the car and will be up here most any time. Since three o'clock this morning I have been trying to get here by bus. I was stranded over in Danville.

This is the first round table discussion I ever tried to lead without previously talking to some members of the panel. Mr. Best, Mr. Crane, Mr. Gerardi, Mr. Weschcke, Mr. Snyder, Mr. Wilkinson.

In leading a discussion on northern pecans, I don't know how well this group of nut enthusiasts agree. I think we should have an understanding of what a northern variety is. About all I picked up I got from Ford Wilkinson, introducer of many of our leading varieties. He knows where every one of them is standing. I don't know how many times he has been up there. We owned two of the most valuable. During the floods of '37 when water was over Louisville, Paducah and the original Major and Greenriver trees the farm hands were sent out to clean up the debris so they worked it out and ended those two trees. Now this Niblack, that is from up here around Vincennes, the Posey originated in Gibson County, Indiana, the Busseron is from southern Indiana. The Goforth is from New Haven, near Shawneetown, Illinois. The Tissue (Tissue Paper), the Giles and Johnson are from Kansas. Gerardi has a few from Southwest Illinois. We can't say north of the Mason-Dixon line; we say "close to the Mason Dixon."—Is that north or south out there in Kansas?

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MEMBER: It's Republican.

MR. MAGILL: I'm not counting that. West of the Mason-Dixon line.

I assume that this group would be interested in certain factors and maybe we can get it out to the crowd in a more interesting way by asking questions. What factors would you take into consideration in trying to make a decision? We recognize the southern varieties would be more easily killed by certain temperatures. You're from Illinois. Read off your contribution. What is your observation on these northern pecans?

MR. GERARDI: The varieties that we introduced around our particular area I could give as much for as any. These others have all been tried and with close observation there is not so much difference in the varieties I can see. I will name three or four of those varieties. The Gildig pecan is a little longer than the Indiana, but the same shape. This variety I tasted. I think the flavor is better in the Gildig. Soil variations will make a difference and it is a little longer. That is the one variety I like very well. A little slow in bearing, the trees in the nursery have no nuts before five years. After that time, it began to build up, until we had spittle bug infestation and that has been a battle. It suddenly appeared. The first I noticed was the native seedlings with spittle bug and then it moved into these plantings of these better varieties and it is very bad. In the last four years it is noticeable on the amount of nuts taken off. Because of killing that latter twig growth, it destroyed the crop of the future years. We have had the trees bear at four years old. They have a wonderful set until the spittle bug gets hold of them. From the first to the tenth of June, it's around until the 25th of July. And the second brood was active and of course it doesn't take the nut off. Most of the damage is on the twig. The first brood insect gets right around where the cluster of nuts set and it drops off. It seems to girdle the tree. The insect bores into it. I had a little difficulty telling just what quantity was on this Gildig pecan.

The next variety is the Fisher pecan, very much like the Major. The fact is I think it is a little more elongated. The youngness of bearing is the same. The Major started at three years old. The three-year tree had several sets of nuts. It keeps building on and the bearing isn't getting less.

MR. MAGILL: Do you find your bearing earlier? In top working a seedling tree?

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MR. GERARDI: Top working will gain at least two years. Then again depending on the size of your root stock. You will gain at least two years. Under adverse soil conditions at least five years.

MR. MAGILL: Do you plant seedlings where you want them to grow and then later top work?

MR. GERARDI: I haven't because I have been producing them in a nursery. I don't think we have time for pre-planting these pecan seeds where you want the tree to grow. I think it is advisable in many areas. If you can plant a nut tree you can go right ahead and there is no further care to be given it. After the Fisher and the Gildig is one called the Queens Lake. (This was called Gildig number 2.) It is a little more round. It is stubby and heavy in diameter something like the Money-maker among the southern varieties only not as large. It is a little smaller.

Another variety is the Duis. He had named two or three, including the Swagler and Duis variety. I noticed two years ago after he had died, the ground had changed hands. I saw the tree but it had very few nuts. The tree was apparently ten years old. I don't believe there are more than a dozen nuts. It was in a creek bottom, growing very rapidly. The Duis pecan is a nice size. It is a little larger than any of the commercial northern varieties. As for the bearing, I am a little skeptical. The Swagler variety I have practically abandoned. It is very much like the Norton. Clarksville I like very well. The Norton (parent of Clarksville) does not bear at all for me. I have ruled that one out. The Swagler gives a little trouble with late growth and winter trouble, winter damage, from the late growth in the fall. Consequently I haven't had any fruit until the present time.

MR. MAGILL: We'll come back to you later. I want to present some points in a letter from Dr. Frank B. Cross, of Oklahoma A.&M. College. They spent a lot of time on pecans in Oklahoma. They don't all have oil wells. He makes two or three statements I hadn't thought of. I will just throw these in to carry this discussion along.

"In comparing the two groups of nuts, namely, northern and southern, we find that practically all northern nuts require a longer rest period, than do the southern nuts. This means that the northern nuts for the most part begin growth later in the spring and begin to mature leaves and

shed leaves and drop nuts before the southern varieties. The Major and the Greenriver are perhaps somewhat different from others of the northern varieties in that their maturity date usually falls with the earlier southern varieties.

"In order of production, I would rate the northern varieties as follows from highest to lowest: Major, Greenriver, Busseron, Indiana, Niblack, Kentucky, Warwick, Posey, Coy, Tissue, Johnson. Perhaps a little broader classification and grouping should be made. In my judgment, the Major, Greenriver, Busseron, Indiana, and Niblack compose one group which may be depended upon for fairly satisfactory production. The Kentucky, Warwick, Posey, Coy, Tissue, and Johnson have consistently been much lighter producers than those named in the first group.

"In order of desirability for planting I would make a list about as follows: Niblack, Major, Greenriver, Busseron, Indiana. I list the Niblack as first choice because it seems to be about as productive as any of the other varieties, and because of its excellence as a cracking nut and the quality of the kernel. The Niblack is really a very desirable nut for cracking, when it is cracked by such devices as the Squirrel cracker which applies pressure to both ends. The kernel comes free from the shell. In a good many varieties, such as the Indiana and Busseron the kernel and shell do not drop free, but the kernel frequently is wedged in furrows in the shell so that the two must be pulled apart. This is not true of the Niblack. When they are cracked by end to end crackers, the shell and kernel drop free. I list Major as second choice because of its good production. It is a little bit late in maturing for a variety of the northern group, and will sometimes get caught by frosts in many northern localities. The nut is not a desirable one for cracking because of its shape. A good cracking nut must be oval. The Major is comparatively round and many of the kernels will be crushed when they are cracked. The Greenriver is a good producer but it is a little bit late. The Indiana and Busseron are both proved to be good producers.

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"Comparing the general production of the northern varieties and the southern varieties, as groups, the northern varieties seem never to be so productive in Oklahoma as are the southern varieties. Much more dependable production may be obtained from the southern varieties.

"Some data on cracking percentage of nuts and size of nuts might be desirable. This list is not complete, but contains several different varieties.

<i>Variety</i>	<i>No. Nuts per Pound</i>	<i>Kernel Percentage</i>
Busseron	62	47
Greenriver	80	49
Major	57	45
Posey	53	54
Warrick	63	48

"Of the nuts mentioned, the Posey is definitely larger than any of the others. It is a very fine type of nut, having a high kernel percentage. It is rather flat in shape, but is attractive in appearance. Were it not for the fact that the trees are consistently light producers, it would be a very desirable nut."

MR. BEST: They bear all right up here.

MEMBER: Where would it rank in the ability to bear?

MR. GERARDI: I would say third or fourth. Gildig, Major, Greenriver and Posey.

MR. BEST: I'd want to put Indiana and Busseron pretty close to the top. Major as one, probably Busseron and Indiana as second. Then I'd come along with probably Posey as third or fourth because, while Posey may not be the best bearer in our section, it does make a wonderful quality of nut which always matures. This matter of maturity in pecans is important.

MEMBER: How about Niblack?

MR. BEST: We haven't had too many trees that produce too many nuts. It is a high quality nut. It would be somewhere near the top. You wouldn't call it a relatively heavy producer. It hasn't fruited as early as the rest. We have had trees as old as 15 years. There is another good pecan. That is the Stevens.

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MR. MAGILL: You and I will have to have Ford Wilkinson do our climbing. You find that to be a good producer. It's early. Getting back to our first consideration, we are pretty close to the north line. We have these Cass County pecans. We are just getting our first nuts. Close to Cass County—Champaign-Urbana still is the United States—not all Republicans.

MEMBER: How does that compare in Missouri?

MR. GUENGERICH: What little observation I have had about west central Missouri, it has been satisfactory. I would pick out Major from my observations. Then probably the Indiana, Greenriver. Beyond that there is some question.

MR. MAGILL: I have an idea about that Major I have been a crank of pollination on apples. We had many orchards planted in Kentucky. The Major for pollination is what Jonathans are to apples.

A week ago we had a couple hundred people at a field day down in Kentucky. We were going

around over the ground and we got five pecan trees and a lot of the records were lost. I don't know how old these pecans are. I think they were planted in '17 I don't know what variety they are. We think there is one Greenriver. We really don't know what they are. There is many a pecan planting in Kentucky that was a failure because there wasn't anything to pollinate. If you were to judge the value of the tree, two and a half feet in diameter, big enough to make a world of pecans, you would have to remember that just because we didn't have something to pollinate we didn't have any pecans. I got a few to graft in Greenriver and they do fine bearing. So things like that lead me to believe there is something in pollination. We plant them out there on the bank of the west fork of the Kentucky River. We got the Major, Greenriver, the Busseron, and one other, and the Major had more crop every year. The Greenriver is about two years later. I don't know which are the best pollinators.

MR. SNYDER: I better tell you where the Iowa trees are. They are approximately 300 miles from here. We are 150 miles north. We are also 180 miles west. We have temperatures up there too that we have to figure on. The temperature in most years gets to minus 20 and the coldest we ever had was minus 42, but that was only for an hour, but temperature is only one factor. An old professor of the University of Iowa, regarded wind as more important than temperature. The more I see of wind killing, the more I believe he is right. Wind is more important than temperature. If you have your trees surrounded, you don't get wind injury. The trees I am reporting on were planted from 1920 to 1930. Some of them now are 16 to 18 inches in diameter and 30 feet high and the varieties are such as we got from Mr. Wilkinson. Indiana, Busseron, and one other which Mr. White—he is a wholesale druggist interested in horticulture—selected and he knows the nut trees probably better than any other one man. He kept in contact with these river rats and they would always bring anything to him they thought was of interest. We have a bunch of seedling trees about the same age and size which never bloom at all and of course they are ready for cutting out. I don't know why there would be a number of seedling trees that would never bloom.

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DR. CRANE: In extensive breeding work, Mr. Clarence A. Reed started in at Albany, Georgia, with 4,000 seedlings and out of 4,000 about half that many came into production and bore fruit enough so we could tell what the fruit was like in about 15 years. The other half just never did bear. Those trees had grown and made large trees and in a lot of cases they carried large leaves but there was no way we could predict anything about fruiting. It was discouraging for that reason. We quit, in our breeding work, growing the seedlings beyond one year. We make our crosses now and grow them one year in the nursery. We plant nuts at harvest and grow them until they form leaf buds and graft from the seedlings on old trees cut back. We can save anywhere from one to three, four, or five years. There are a great per cent that will not bear.

MR. MAGILL: In Iowa, out there, what varieties are making good?

MR. SNYDER: There aren't any. As nut producers they aren't worth anything. Why not plant the hicans? They ripen better but don't bear. The hicans make one of the prettiest trees but they don't bear.

We make no plans for pecans unless we have a season with no freezing until the middle of November. So that is where the pecans are that far north, except as shade trees.

MR. H. W. GUENGERICH: I feel that I am out of my territory in talking about nut growing to this Association, but I have had a few things forced on my attention that may be of interest.

When I first joined Stark Brothers Nursery, Paul Stark asked me to look into the possibilities of locating a pecan variety that would be satisfactory north of the southern pecan belt. I talked to our Missouri extension horticulturist, Bill Martin, and he informed me that a lot of pecans are being grown around Brunswick, Missouri, on the Missouri River. The Missouri flows northeast from Kansas City for about 75 miles and then swings toward the south again. Brunswick is located at the northernmost point on the river, between Kansas City and St. Louis. It is about 150 miles west of Louisiana, and in general the weather becomes more severe as you travel West. So pecans that thrive and mature at Brunswick are pretty rugged.

I went over to Brunswick to see a friend who introduced me to some pecan growers. One of these men has an interesting story and I wish he were here. I tried to bring him along but he could not get away from his farming operations. He operates several hundred acres of farm land in the Missouri River bottoms and his house stands in a grove of native pecans. When he went into his house he pointed to a hook on the door post where he tied his boat the previous spring when he moved his family out because of high water. That year, 1947, all his grain crops were destroyed by the flood but that fall he harvested 50,000 lbs. of pecans. They sold for 25¢ a pound and the total expense was for picking them, off the ground. In a year like that, \$12,000.00 would come in handy. It rained again in Kansas this year and I called him and asked about the flood. He said he had a couple of inches of land that wasn't covered with water, but he expects to gather 40,000 lbs. of pecans this fall. That is interesting because there are thousands of acres in the middle west where crops have been destroyed by floods. Yet here is a crop that grows on native trees with very little care, that will pay off despite high water.

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I asked my friend what effect the high water would have on the pecan foliage and he replied that the leaves would fall, but that the trees will produce new leaves and the nuts will mature. He has been through this before and knows what he is talking about.

Reference was made a short while ago to the pecan as a shade tree. I think this is one of the big

opportunities in pecan growing. Recently I drove from Louisiana, Missouri, to central Ohio and saw a string of dead elms along the entire route. Now the oaks are threatened in the same way. We don't know what to do about shade trees. Some scientists from Holland visited us several weeks ago and they weren't very enthusiastic about their disease resistant elm selections. We had hoped that these selections might provide the answer to the elm tree problem.

Now pecans make very attractive shade trees. I used to live near Kansas City on a place where someone had planted 18 or 20 pecans right along the side of a golf course. When the trees were about 20 years old a fairway was laid out through this pecan grove and now blue grass grows right up to the tree trunks. A lot of other shade trees are shallow rooted and lawns do not grow well under them. I think there is a tremendous opportunity to plant pecans as shade trees.

There is just one other point I want to make. Undoubtedly we need better varieties. The nurseryman realizes this better than anyone else. But when my friend from Brunswick sold his native pecans he got just about as much for them per pound as the southern growers got for their much larger southern seedlings. Several commercial pecan crackers that I asked about this stated that the northern nuts have a better flavor and they produce more kernels per pound. So the size of the kernel doesn't make too much difference, although we all prefer the larger nuts.

Pecans in Northern Virginia

J. RUSSELL SMITH, *Swarthmore, Pennsylvania*

(Extracts from a letter to the NNGA secretary, November 26, 1951)

Having sold my Virginia cabin and the nursery business [Sunny Ridge] I have been down to the nursery for the last month getting rid of trees. A job of digging is one thing and that of packing and shipping is another. The man I had could do one but not both, and competent persons to pick up for either job are not available, so I have been standing in the gap, getting calluses on my hands and getting rid of \$16,000 worth of trees.

Now as to facts on northern pecans:

I find the Busseron bears with regularity at Round Hill, Virginia, in a tight bluegrass sod. This pasture is not of high fertility and has had a small amount of commercial fertilizer. It is on a hillside that has probably lost all of its topsoil once or twice in the last hundred years, though not for the last twenty because it has been in grass.

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My neighbor, Henry B. Taylor, Hamilton, Virginia, has Busseron, Butterick, Greenriver, Indiana, and Major, all bearing well to heavily.

Unfortunately this year the Greenriver hulls did not open, although the nuts were well filled. Ordinarily I believe they have been dropping their nuts, but not all at once.

Twenty-five years ago I planted some Butterick and Busseron along a stream on a dairy farm on which I was born. There was no regular record of their performance, but I have observed that the Buttericks have had a good crop in 1950 and also in 1951.^[6]

I had previously concluded that the Butterick was almost a non-fruiter, and quit propagating it years ago. These especially productive Buttericks are on alluvium near the barn in a permanent pasture where the cattle congregate while waiting for the gate to open to let them into the barn. It is therefore fertilized over and over again with cow droppings.

Mr. Taylor's excellent yields are also produced on trees that are on unusually fertile soil.

My conclusion is that the pecan is a very active feeder, and what it needs is about three times as much fertilizer as is required for any ordinary crop.

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It is time somebody better placed than I am made a systematic experiment as follows:

1. Feed pecan trees at least five times as much plant food as the nuts and leaves use.
2. Injure the trees by hacking the bark to make them bear, and see how much they can be made to produce by this means.

A Busseron tree in the town of Round Hill stands in a backyard of a friend of mine and they use it, I think, to tie clotheslines to and maybe the boys have had a little fun driving nails into it and it bears every year.^[7]

The real find of my observations is a pecan known as All State, which has been wonderfully advertised by one of your fellows.^[8] On a catalog it produces a nut two inches long—wonderful. On Mr. Henry Taylor's tree in Hamilton, Virginia, it produces a tiny, symmetrical, pointed nut too small to be contemptible, except for squirrel feed. They might have time to handle the crop.

FOOTNOTES:

[6] In the NNGA Report for 1935, Mr. C. A. Reed told of studies of blossoming habits of pecan varieties at Rockport, Indiana, conducted for four seasons in co-operation with Mr. J. F. Wilkinson. There the Busseron was found to be a protandrous variety, shedding most of its pollen, and in some years all of it, before the period of receptivity of its pistillate flowers. "With Butterick ... the order was reversed, as the period of receptivity began first," and it was classified, therefore, as regularly protogynous. "... Furthermore, upon close observation it has been found," he said, that trees of the Butterick variety "develop very few pistillate flowers, and that many of these wither up and drop off, apparently because of inherent weakness. From this, it would appear that light bearing is not necessarily due to lack of suitable or adequate pollen." The Butterick had a record of practically non-bearing performances during the four years (1931, 1932, 1934 and 1935) at Rockport, which is duplicated by its performance records at other locations and other years, so it is generally on the discard list. But when it does bear and mature its nuts it is a good pecan. Mr. P. W. Wang rated it his first choice of northern pecans fruited in China.

Mr. Reed listed as protandrous Busseron, Kentucky, Major, and Niblack varieties, whereas Butterick, Indiana, and Posey were protogynous. He did not specify in which class the Greenriver fell. Major during each of the four years, had an interval of 1 to 3 days between the last shedding of pollen and the first pistil receptivity; Warrick, an obsolete variety, had some overlap each year as did Indiana and Posey. The Kentucky, a discarded variety, had overlaps the three years it was observed. In two years it was observed, Niblack had staminate and pistillate flowering together one season, and staminate overlapping four days into the period of pistillate receptivity the next. Busseron, Butterick, and Greenriver sometimes had overlaps and sometimes intervals. Reed's conclusion, that "northern varieties of pecan ... appear to be partly or completely dependent upon other varieties for pollen," still holds good, as does his second observation, that "all varieties tend to vary, from year to year with respect to periods of pollen shedding and pistil receptivity." But more records are needed, and any members who have two or more varieties flowering in 1952 can make valuable contributions by taking accurate notes on their habits. There are now newer varieties for which such data are completely lacking, and until more is known, no reliable basis can be had for matching them with the best combinations for adequate cross-pollination.—J. C. McD.

[7] I think the first phase of the suggested experiment has more to recommend it than the second. Perhaps the Round Hill tree gets needed zinc from clotheslines and roofing nails. A more scientific way to apply zinc is to use zinc sulfate in sprays or ground applications, and these are to be used on some trees at Urbana which Dr. Crane diagnosed as zinc-deficient.—J. C. McD.

[8] The Bradley Brothers, who do not court anonymity, are no fellows of the Association or of the University of Illinois. They have been known to sell some kind of grafted pecan trees in recent years, possibly the Stuart or some other variety available from southern wholesale propagators. Mr. Taylor was lucky enough to have his order filled with a southern Illinois seedling which at least is good for the squirrels. We haven't yet seen any All State nuts from Maine or Montana. The Bradley variety is an obsolete southern pecan.—J. C. McD.

Pecans in the Vicinity of St. Paul, Minnesota

CARL WESCHCKE

About 25 years ago pecan seeds from the most northern natural habitat in Iowa were planted in garden soil here in St. Paul. Most of them were later transplanted in nursery rows at my farm seven miles east of River Falls, Wisconsin. Out of approximately 300 trees, about 40 are still living, of which 25 have grown well. The remainder probably have not found soil conditions to accommodate their natural vigorous growth. Where the trees are in deep soil with sufficient plant food, they have done well, the largest tree being about 10 inches in diameter, and several of these have been bearing nuts for five years. The nuts were immature, however, but in the fall of 1949 about 70 of the best ones were planted in a seed bed and today about 15 living trees of pure pecan parentage represent the second generation.

This evidence is very important, for although the pecan has been almost as hardy as any native tree (such as the bitternut hickory, the butternut and the black walnut), yet the length of season required for the maturing of nuts is a primary factor which would have to be considered in recommending pecans for planting this far north. However, it has been my observation that these pecans have slowly cycled their way into our season, and it is gratifying to notice that this spring many leafed out at nearly the same time that the black walnut vegetated, which of course is much slower than the local butternut. This shows the tremendous adaptability of the pecan, and it is hoped that this ability to adapt itself to soil and climatic conditions will eventually cause it to produce small but edible pecans here in the north.

It is my hope, also, that I can use our locally raised pecan seedlings on which to graft our many successful varieties of hickories, which heretofore have been limited to some extent in their usefulness because we had only the local bitternut stocks on which to graft. Whereas the bitternut is an excellent stock for some varieties of shagbark hickory and even for shellbark, as well as pecans and hicans, there would no doubt be an increase in the scope of hickory planting if we had hardy pecan seedlings as understocks. At first, when comparing the growth of the native

bitternut seedlings with that of pecans, locally raised in the same soil, it appeared that the pecan was a much more vigorous grower; but experiments with different types of soil and fertilizers indicate that we can get seedlings of certain bitternut hickories to produce from two to three feet of growth in the first year. I have even found several of these same hickory seedlings of two seasons' growth which, when transplanted last fall, are large enough to graft this spring. However, experiments have not proceeded far enough to verify the practical side of this new idea of hickory propagation.

Only one variety of pecan which was among the original seedlings, and which existed as a lawn tree for more than twenty years in St. Paul, was compatible with the bitternut hickory root systems; but enough of this variety of pecan has been grafted on local hickories to demonstrate that this is perfectly feasible as far as the union is concerned. In fact, several of these larger grafted trees have been bearing staminate bloom for two or more years. No nuts have been produced of this Hope variety as yet, and although it has been distributed on the market, it has always been classed as an ornamental rather than a fruiting variety. Of course, the pecan part over-grows the stock. In other words, there is a larger diameter above the union than in the stock below the union. So far, this has not interfered with good growth and hardiness, whereas the black walnut grafted on butternut (which is a similar combination as far as results go) more than thirty years ago in experimental work, indicates that this is a wrong procedure. Very few nuts were ever gathered from grafts of black walnut on butternut, although in most instances they continue to live and thrive.

The pecan here is subject to much the same insect pests as the black walnut, but suffers less from hickory borers and types of insects which seem to be like oak pruners. This might be useful later on in maintaining healthy pecan trunks with hickory tops. Probably the early formation of rough bark, for which the pecan is noted, may be responsible for this. The nuts that have been produced so far have been extremely small, but here again the writer has observed an increase in size over the original nuts that were produced. In some seasons, at least one tree has produced nuts of sufficient size to be good enough for home purposes. They are nothing, however, to compare with any named northern pecans, such as the Major and the Indiana varieties. Practically all of these northern pecans have been tried in our environment, and some have lived for several years. Most of them have died because there was no congenial union of the pecan grafted on our local bitternut stocks. We do, however, have congenial grafts and good living specimens of the Norton and the Burton, which are no doubt some form of hybrid.^[9] Hicans that graft well on local bitternut stocks are the Rockville, first in hardiness and for bearing nuts of the usual size for Rockville. They do not mature yet, but it is expected that favorable years will mature these nuts.

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Next in hardiness is the Green Bay, and next are Burlington, Des Moines, Bixby, and McCallister. Although making good growth, these have seemed to be too tender for our climate, although we have good living specimens of them and believe that some have begun to bear, particularly the Bixby, unless names of grafts have been mixed up. These latter trees are mostly in the deep woods, and it is hard to get close data on their behavior and bearing.

A Marquardt (which is supposed to be a lost variety of hican) I believe exists on my place, and I have taken it out of the deep woods, where it was grafted nearly thirty years ago from scions direct from J. F. Jones, and have placed scions on stocks in the vicinity of the nursery, where they can be watched. The differences between the scions freshly grafted last spring and the known varieties of Rockville, Green Bay, and Burlington are distinctive. Also the Marquardt (if it is a true Marquardt) last winter indicated much greater hardiness than did grafts made at the same time with Rockville and Burlington varieties. However, it is too early to say for sure whether the Marquardt is represented among my varieties of hicans. The Marquardt grafted on local stocks used by Jones and purchased as individual trees, did not survive. It is assumed in this paper that this discussion would naturally lead to pecan hybrids, rather than staying with the pure blooded pecan this far north, for some of the varieties come very close to being pure pecans, but still, like Norton and Burton, probably are distinct hybrids.

When some of the original seedlings from Iowa were transplanted from the nursery row they were already quite large trees and we did not get all the roots. The portions that were cut off were left in the soil. One of these roots sprouted three trees; one was subsequently moved into the orchard and marked because of its vegetative nature, and a variety of hickory known as the Weschcke was grafted on it. It makes a very good growth, but in most instances our native bitternut stock produces an equally good growth in unions with this particular variety. This particular performance is indicative of things to be expected for this combination in the future.

In conclusion I would say that the pecan is far from being a practical nut tree for our vicinity, and is only a very hopeful dream. But so, also, were the best hickory varieties 30 years ago when I first began my experiments.

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FOOTNOTES:

- [9] The Norton name seems to be shared by a pecan and a hican. The Burton hican from Owensboro, Ky., is presumably a pecan-shagbark cross with an excellent nut, fruitful farther south.—Ed.

Preliminary Report on Growth, Flowering, and Magnesium Deficiency of Reed and Potomac Filbert Varieties

H. L. CRANE AND J. W. MCKAY^[10]

During the course of filbert breeding investigations at the Plant Industry Station, Beltsville, Md., covering a period of approximately 18 years, the leaves of certain seedlings scorched badly in mid or late summer. Certain other trees showed little or no evidence of this disorder. It was thought that, because filberts thrive best under maritime climatic conditions of cool summers and mild winters, this scorch was probably due to high temperatures accompanied by deficient soil moisture.

This breeding work resulted in the introduction in 1951 of the Reed and Potomac varieties, which were produced as a result of crosses between the American filbert, *Corylus americana*, and the European filbert, *C. avellana*. The original trees of these varieties had been under observation for more than 10 years, and their performance had been such as to indicate their suitability for home plantings under eastern conditions. Furthermore, these varieties had shown little or no evidence of scorch and had held their leaves well.

In early spring of 1948, an experimental orchard, consisting of 36 layered trees each of Reed and Potomac, was planted at Beltsville, for the purpose of testing them more fully than had been possible before as to their suitability for eastern conditions. The orchard was designed also for study of their response in tree growth and fruiting to differential fertilizer treatments. Although this experiment has been underway now for only three years, certain of the findings are thought to be of such importance that a preliminary report should be made at this time.

Experimental Plan

The site selected for the orchard is a gentle slope varying from five to 15 percent and providing good air drainage. The soil is a Riverdale (tentative series) sandy loam that had been in orchard grass sod for 10 years before the experiment was begun. Much of the land on the Plant Industry Station farm is now known to be low in available magnesium and potassium. Tree crops, including peaches, pears, and apples, have shown deficiencies of one or both of these elements. The trees were planted 20 feet apart on the contour in pairs, one of each variety in a plot, with six plots in a row. The 36 two-tree plots were in six rows. Thus, the experiment was arranged in a 6 by 6 Latin square and six fertilizer treatments were used. After planting, the trees received frequent cultivation and a uniform application of one pound of 10-6-4 fertilizer. The following spring differential fertilizer treatments were applied: Nitrogen, phosphorus, potassium, complete, nitrogen and potassium, and check. The amounts applied per tree in fractions of a pound were elemental nitrogen 0.2, phosphoric acid, 0.4, and potash 0.2. In the spring of 1950, the amounts applied per tree were doubled; and these same amounts were applied in the spring of 1951. Nitrogen was applied in the form of nitrate of soda, phosphorus as 20 percent superphosphate, and potassium as 50 percent muriate of potash. Strips about six to eight feet wide on each side of the tree rows have been cultivated frequently, but strips of orchard grass sod have been left in the tree row middles to prevent soil erosion. The trees have been sprayed with DDT or parathion or both to control Japanese beetles and mites.

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Growth Responses

To determine the growth responses made by the two varieties to the differential fertilizer treatments, diameters of the tree trunks one foot above the soil were measured each spring before growth started. These data are not given here because in 1949 and 1950 there were no significant differences in the growth of the trees as a result of the differential fertilizer treatments. However, trees of the Potomac variety made more growth than those of the Reed variety. At the end of the 1949 and 1950 growing seasons, the average diameters of the tree trunks of the Potomac variety were 16.3 and 25.7 millimeters, respectively; those of the Reed variety were 13.6 and 22.4 millimeters, respectively. The differences 2.7 and 3.3 millimeters, are highly significant. Under the conditions of this experiment, the trees of the Potomac variety are much more vigorous than those of the Reed. The greater vigor of the Potomac trees may account for the fact that they produce suckers much more freely than do trees of the Reed variety. The habit of producing abundant suckers is an advantage in propagating by layering, but it is a disadvantage in orchard trees because the suckers must be removed for optimum nut production. Whether the differences in vigor and suckering habit of the two varieties shown thus far will affect their performance as orchard trees will have to be determined by future observations.

Flowering Response

Each year at the height of the flowering period, each tree in the experiment was rated on the catkins it carried. So far, there has been no effect of the differential fertilizer treatments on the production of catkins. However, there have been very highly significant differences between the Potomac and the Reed. In 1950, only four of the 36 Reed trees produced catkins, whereas 32 of the 36 Potomac trees flowered, and approximately half of them were heavily loaded. In 1951, the number of Reed trees producing catkins was 12 of the 36, whereas 35 Potomac trees flowered.

The amount of pistillate flowering during the two years was small on both varieties and not greatly different; this indicates that their nut-bearing potentialities may be about the same. The amount of pollen produced by the Reed variety has always been considered ample for cross-pollinating the Potomac, even though the former has been a light producer of catkins.

Records of dates of flowering of the two original trees over a 10-year period, and of these young orchard trees over a 3-year period, show that there is great variability in time of flowering, depending upon the sequence of weather events each season. Fertilizer treatments have had no measureable effect. The trees have shed pollen as early as January and as late as April, and stigma receptivity sometimes has continued intermittently for two months. The average period of flowering at Beltsville is the last week of February to the first week in March. Both varieties have flowered at the same time under all seasonal conditions observed. This means that additional pollinators will not be necessary when the varieties are planted together in an orchard.

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Symptoms of Scorch

The visible symptoms of scorch do not begin to appear under conditions at Beltsville until about the middle of July or later. The first symptom is fading of the green color, especially around the margins of the leaf blade. Sometimes this chlorosis results in blotches, which may extend for a considerable distance from the margin towards the mid-rib. This stage is of short duration, as the tissues of marginal chlorotic areas or those of the blotches soon die, roll up, and turn brown. Some leaves show yellow blotchiness over most, if not all, of the surface and this may develop into brown patches of dead tissue or the yellow leaves may fall before the tissues die. The older leaves, those at the base of a shoot, are generally the first to show chlorosis and scorch, and the terminal leaves are the last to show such symptoms. On severely affected trees all the leaves on a shoot may be scorched at the time scorching is observed. Severely affected trees drop part or all of their leaves prematurely. The leaves dropped are those that are scorched or that show yellow blotches. Such trees do not make satisfactory growth, they set few nuts, and the nuts are usually poorly filled at harvest. The symptoms of scorch on filbert leaves are similar in many respects to magnesium-deficiency symptoms on apple (1, 5, 6)^[11] and tung leaves (3).

Leaf Analyses^[12]

No differences in appearance of the trees as regards leaf scorch were noticed the first year after the differential fertilizer treatments were applied. However, in late July and early August of the second season, severe leaf scorch developed on the trees that had received potassium alone or nitrogen plus potassium, and scorch developed to some extent on the check trees. On August 15, 1950, leaf samples for chemical analyses were taken from each tree in all replications and composited by treatments into six samples. The data on the chemical composition of the leaves as affected by the differential fertilizer treatments are given in table 1.

These data show that the fertilizers applied to the trees were taken up by them and that the composition of the leaves was significantly affected. The trees in treatments 2, 3, and 6, which did not receive nitrogen in the fertilizer, had lower percentages of nitrogen in the leaves than those from the other plots. Their light green color indicated that in the middle of August they were deficient in nitrogen when its concentration was 2.3 percent or less.

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Table 1. Chemical composition (oven-dry basis) of filbert leaves collected August 15, 1950, from fertilizer experiment, Beltsville, Md.

Treatment	Composition of leaves						Ratio Mg (percent)
	Ash	N	P	K	Ca	Mg	K (percent)
	%	%	%	%	%	%	
1. Nitrogen	6.68	2.52	.129	.945	1.30	.143	.151
2. Phosphorus	8.56	2.29	.160	.885	1.60	.186	.210
3. Potassium	9.39	2.31	.150	1.650	1.93	.155	.094
4. Complete	7.18	2.43	.133	1.175	1.63	.132	.112
5. Nitrogen and potassium	7.62	2.49	.119	1.480	1.33	.110	.073
6. Check	7.38	2.32	.188	.890	1.70	.149	.167

Potassium applications produced the greatest effect on leaf composition, as they increased the concentration of that element in the leaves by 0.285 to 0.760 percentage unit over that in the leaves from the check trees. In addition, it seems likely that this great increase in the potassium content of the leaves was accompanied by a decrease in their magnesium content, since this usually has been found to result. When the ratios of the percentage of magnesium to the percentage of potassium in the leaves were calculated, it was found that they were rather low for the trees that had been fertilized with potassium. The magnesium-potassium ratio was highest in the leaves from the trees fertilized with phosphorus only, followed in order by the check and nitrogen treatments.

Relation of Magnesium Deficiency to Leaf Scorch, Winter Injury, and Fungus Infection

On August 15, 1950, at the time the leaf samples were taken, each tree in the experiment was scored as to the degree of leaf scorch present. In the winter of 1950-51 soil samples were taken from each plot receiving potassium alone and the lime requirement was determined by the

Division of Soil and Management and Irrigation, of this Bureau. The lime requirement was found to vary greatly, ranging from 1500 to 6700 pounds per acre. In early spring of 1951, high-magnesium dolomitic lime was applied uniformly at the rate of 1500 pounds per acre and in addition each tree received 5 pounds of Epsom salt.

Each tree in the experiment was scored for degree of winter injury on May 10, 1951. By August 3, leaf scorch was evident on trees in certain treatments and the trees were scored for leaf scorch. At this time it was found in certain treatments that the trees that had not shown any appreciable amount of scorch heretofore had some severely necrotic leaves on them. Careful examination revealed many fruiting bodies of one or more fungi in these necrotic areas. Each tree was, therefore, scored for the presence of this disease, which has been tentatively identified by Paul L. Lentz, of this Bureau, as being caused by *Labrella coryli*. The data on leaf scorch, winter injury, and the fungus disease are given in table 2.

Table 2. Relation of magnesium deficiency in filbert leaves to leaf scorch, winter injury, and disease caused by *Labrella coryli*

Treatment	Ratio Mg (percent)	Scorch[1] score (1950)	Winter[2] injury score (spring, 1951)	Scorch[1] score (1951)	Disease[1] score (1951)
1. Nitrogen	.151	1	4	7	9
2. Phosphorus	.210	1	3	1	119
3. Potassium	.094	21	22	24	3
4. Complete	.112	2	5	8	11
5. Nitrogen and potassium	.073	13	19	9	5
6. Check	.167	14	6	6	8

Note [1] Total plot score for 12 trees; highest possible score 36. The scale for scoring was 0, none; 1, light; 3, severe.

Note [2] Total plot score for 12 trees; highest possible score 48. The scale for scoring winter injury was 0, full leaf, no injury; 1, few dead twigs; 2, half of buds not growing; 3, very large amount of dead twigs; 4, only a few buds growing.

Trees that had received potassium alone had the most severely scorched leaves and more of them on August 15, 1950, followed by those that had received nitrogen plus potassium. The trees that had received nitrogen or phosphorus alone showed practically no scorch, each having a total score of 1; and the complete fertilizer trees a total score of only 2, while those in the check had a total score of 6. These scores indicate that scorch is related to magnesium deficiency or unbalance. There was a close relation between the amount of leaf scorch in August, 1950, and the amount of winter injury, the coefficient of correlation being 0.97, which is very highly significant. This coefficient means that 94 percent of the winter injury sustained could be accounted for by the leaf scorch present the preceding summer and early fall.

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The scorch scores of August, 1951, show that there had been no consistent improvement from the magnesium-deficiency condition as a result of the dolomite and Epsom salt applications. The scores for the disease caused by *Labrella* show that applications of phosphorus alone increased the incidence of the disease and those of potassium alone or potassium plus nitrogen decreased it.

In all cases, the incidence of leaf scorch, winter injury, and disease were strikingly different on the Reed and Potomac varieties. In the summer of 1950, the total scorch score of the Reed variety was 26 and that of the Potomac 18, and in August, 1951, the scores were 36 and 19, respectively. The total winter injury scores were 46 for the Reed variety and 21 for the Potomac. Thus, it is clearly evident that under the conditions of this experiment the Reed variety was much more susceptible to leaf scorch and to the winter injury resulting from magnesium deficiency or unbalance between magnesium and calcium plus potassium than was the variety Potomac. Furthermore, the total score for the incidence of the disease caused by *Labrella coryli* on the variety Reed was 38 as compared with 9 for the Potomac variety. It would, therefore, seem that the Reed is about four times as susceptible to infection by this fungus as is the Potomac. Its less vigorous tree growth, susceptibility to leaf scorch, winter injury, and infection by *L. coryli* may be due to the differences between its nutritional requirements and those of the Potomac variety.

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Conclusions and Summary

The preliminary results of the experiment described show that there is a great difference in vigor, growth, flowering habit, susceptibility to leaf scorch, winter injury, and infection with a fungus disease tentatively believed to be caused by *L. coryli* between trees of the Reed and Potomac filbert varieties. In all cases the Potomac variety has been the superior.

It would appear that much of the leaf scorch on filberts experienced in the past has been due to a magnesium deficiency or to an unbalanced condition between magnesium and calcium plus potassium in their nutrition. The symptoms of magnesium deficiency (scorch), which in general are similar to those on apple and tung, are described. The data presented show that liberal applications of potassium alone, or in combination with nitrogen, resulted in a highly significant

increase in the incidence of leaf scorch due to magnesium deficiency. This in turn resulted in susceptibility to winter injury, the coefficient of correlation being 0.97, which means that the severity of the leaf scorch in August, 1950, would account for 94 percent of the winter injury sustained.

Applications of 1500 pounds per acre of high-magnesium dolomite, together with five pounds of Epsom salt per tree in early spring of 1951, did not produce consistent improvement in leaf scorch. It seems that recovery from magnesium deficiency in filberts is slow after treatment, just as has been found to be the case in fruit trees (2, 4).

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FOOTNOTES:

- [10] Principal Horticulturist and Horticulturist, respectively, U. S. Department of Agriculture, Bureau Plant Industry, Soils, and Agricultural Engineering, Beltsville, Md.
- [11] Numbers in parenthesis refer to Literature cited, p. 55.
- [12] The authors take this opportunity to thank Dr. Harald E. Hammar for making the chemical analyses of the leaf samples.

Bunch Disease of Black Walnut

[Paper expanded from a talk given at the 41st annual meeting of NNGA in 1950.]

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Introduction

For the past several years observations have been made on the development and spread of the bunch (brooming)^[13] disease on *Juglans nigra* and on other species of walnut growing in the orchards at Plant Industry Station at Beltsville, Maryland. Because of the widespread interest in growing walnuts a brief survey of these observations will be given in this paper together with a summary of the history of the disease and a discussion of its possible effect on walnut production.

History of the Disease

The bunch disease of walnut has been known for years. Waite^[14] in 1932 said, "It turned up in Delaware several years ago, where quite a variety of walnuts, including the Persian, the Japanese Group, and the American Black Walnut, were found to be affected. At Arlington Farm, Virginia, during the past 15 years it has boldly riddled the collection of nut trees assembled in the grounds for study and ornamental purposes." Photographs made in 1914 of Japanese walnut trees growing in Georgia and thought to be affected by rosette (now known to be caused by zinc deficiency) have been found in the files of the U. S. Department of Agriculture. Now that the symptoms of the two different disorders are known, it seems clear that the bunch disease was present in those two states at that early date.

Becker,^[15] of Climax, Michigan in 1940 reported on his observation of this disease in that area.

He reports that he observed several cases of it on Persian walnut, Japanese walnut, and butternut, in addition to many diseased eastern black walnuts. He says, "My conclusions are that in witches'-broom (bunch disease) we have a very bad disease that threatens the black walnut trees everywhere".

In 1939, the late Howard E. Parsons, pathologist of the U. S. Department of Agriculture, made an inspection trip to Climax and other areas in Michigan where he studied and photographed diseased trees. Parsons at that time was working on a similar disease of pecan and

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water hickory and was of the opinion that the disease found on the various species of walnuts in Michigan was similar to the one he was studying.

For the past 20 years the bunch disease of walnuts has been under observation by the writers and it seems clear that its incidence has increased greatly during that time. In 1935 scions and buds were taken from diseased eastern black walnut and butternut trees growing at Arlington Farm and grafted or budded on eastern black walnut stock growing in the original nut tree nursery at the Plant Industry Station at Beltsville, Maryland. This was done in an attempt to determine whether the disease was caused by a mineral deficiency or by a virus. All buds and scions died, but the following year two of the seedling rootstocks showed characteristic symptoms of the bunch disease. Since this disease was already present on the station farm it was not definitely known that it was transmitted to the stocks by budding or grafting the diseased material on them.

In December of 1946 Hutchins and Wester^[16] presented a paper before the American Phytopathology Society giving the results of their studies on the bunch disease. In this paper they reported that the disease was transmitted by patch bark grafts performed in 1944 and 1945 and that the incubation period varied from several months to two years. It was concluded that since the disease was transmitted by grafting, and in the absence of a visible pathogen, a virus causal agent was indicated.

Symptoms

The characteristic symptoms of the bunch disease are mainly the production of brooms or sucker shoot growth on the tree trunk and main branches and the tufting of terminals, profusion of small branches from axillary buds, the dwarfing and narrowing of the leaflets, and the dying back of the trees resulting sometimes in the death of the trees. The principal symptom is the production during summer of bushy, wiry growth caused by the breaking into growth of lateral buds that normally would remain dormant over the winter. These buds produce shoots that again branch from lateral buds and the process may be repeated for three or four times, resulting in a tightly packed mass or bunch of small, wiry twigs and undersized leaves. Another characteristic symptom is that this growth proliferation continues unabated until the first frost, and, since the wood of these shoots is thus not properly matured, killing back of the diseased portions of the tree usually occurs with the first hard freezes of winter.

As the disease progresses, the wood in the main branches becomes very brittle and is easily broken by wind or ice. This condition is followed by the dying back of branches and finally the death of the tree. Trees even moderately affected soon become worthless for nut production, as few nuts are set and those that mature are usually poorly filled.

Susceptibility of Species

Extended observations show that of the walnut species now grown in eastern United States, the Japanese walnuts, i.e., the Siebold and the heartnut, are by far the most subject to attack by this disease. These walnuts are so susceptible that in localities where this disease is present the planting of young trees is inadvisable, as they are almost certain to be short lived. Once infected, will endanger other walnut trees in the area.

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Observations at Beltsville show that the butternut is almost as susceptible to attack as is the Japanese walnut. Some workers are inclined to believe that the rather serious decrease in numbers of butternut trees in some areas is due to the bunch disease. The Persian (English) walnut is also quite susceptible, although probably not so much so as the butternut or the Japanese walnut. The eastern black walnut seems to be the most resistant of all, although some evidence indicates that at least certain trees of this species may have the disease but not show symptoms of it. Gravatt and Stout^[17] report that walnut trees may be affected for a considerable length of time without showing recognizable symptoms. Out of a lot of 300 healthy-appearing trees, 37 per cent showed bunch disease symptoms following pruning. Only four percent of the unpruned check trees developed similar symptoms during the same period of time.

Distribution

At the present time bunch disease is quite widespread in eastern United States, occurring in Maryland, District of Columbia, Delaware, New Jersey, New York, Michigan, Ohio, Indiana, Illinois, Pennsylvania, West Virginia, Virginia, North and South Carolina, Georgia, Tennessee, Alabama, and probably other States. No special surveys have been made for bunch disease, and all distribution information has been obtained from observations of U. S. Department of

Damage Caused

Trees with bunch disease may live for several years in a stag-horned or tufted condition. Affected trees generally set few nuts and the nuts that mature are usually poorly filled and hence low in oil content. It is likely that a part of the unsatisfactory growth and fruiting performance of certain eastern black walnut trees may be due to the disease, even though they do not show the symptoms as they are now known. Severely affected trees are subject to cold injury, and in addition the wood becomes very brittle and is easily broken by storms. Although this disease has been known for several years, it is believed that its seriousness has not been fully appreciated, as it does not cause death as soon as symptoms appear. Several years must elapse before the tree succumbs. In the nut tree plantings made at the Plant Industry Station at Beltsville, Maryland, large numbers of butternut, Japanese walnut, and Persian walnut trees were planted. During the following years, although no records have been kept, several hundred of these trees have become affected and have been removed. Consequently at the present time we do not have any butternut or Japanese walnut trees, and only a few Persian (English) walnut trees left in the plantings. So far, not a single eastern black walnut tree has been removed from the orchards because of the bunch disease. Some trees have shown characteristic symptoms of the disease, but following the removal of the entire diseased limbs the symptoms have not reappeared.

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Possible Effects of Bunch Disease on the Walnut Industry

This disease is known to spread to nearby healthy walnut trees, but the means by which it is spread or how infection occurs is not known. No survey has been made to determine whether the disease is present in the various regions in which walnut trees are grown, and hence it is not known how widely it is distributed at present. Its spread is probably associated with an insect vector, and the presence of the vector would determine whether or not local spread would occur. Much more must be learned about this disease before its importance and destructive nature can be fully determined. It seems certain that in localities where the disease is already present there is little use in planting young trees of the most susceptible species unless trees in the vicinity that are already diseased are destroyed. Nurserymen growing trees of the Japanese walnut, butternut, and Persian walnut should be sure that no diseased trees which might infect the nursery trees are close to their nurseries. It is not known how far the inoculum may be carried, but at this time it would seem that in order to be reasonably safe no diseased tree should be allowed to grow within a mile radius of a nursery. Infected nursery trees (or scions) probably constitute the most important means of long-distance spread for a disease of this type.

Control

The only known method of control of the bunch disease is to prevent healthy trees from becoming infected. This can be done only by destroying completely all diseased trees. In the early stage of the disease, sometimes only one branch on a tree may show symptoms; and complete removal of this branch may result in the tree's not showing additional symptoms for a year or more. Except in the case of black walnut, the disease breaks out again; hence cutting out diseased limbs cannot be considered a satisfactory control measure, except possibly on the eastern black walnut.

Case Histories at Beltsville

As a part of walnut breeding work carried on during the past 14 years, approximately 20 large *nigra* trees of named horticultural varieties have been topworked to seedlings of natural first-generation hybrids between *J. regia* and *J. nigra* for the purpose of forcing the seedling scions into early fruiting. Of these 20 trees, 3 have shown such unusual behavior as to merit a description of each in the form of a case history.

Tree Number 838. This tree was cut back severely in the spring of 1942, and on August 26, 1943 vigorous new shoots were budded to 47.11-P₁₇, a second-generation seedling of the O'Conner natural hybrid. The buds grew vigorously in 1944 and early in the season developed symptoms of the bunch disease. By the end of the growing season of 1944 the scion limbs were heavy with the typical proliferated shoots characteristic of the disease. Also, a few vigorous sucker limbs of the stock tree that grew out from below the point of union of the scions showed typical symptoms of the disease, although these limbs were later outgrown by normal shoots and are not now to be seen. In the early spring of 1945 the diseased limbs were all removed from the tree to prevent the further spread of the disease in the area.

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At the same time that the above seedling was budded in the top of this tree, a large lateral limb of the stock tree was budded to seedling number 40.70-P₁. This seedling originated from a nut of the Ohio variety of black walnut that was only about 1/4 the size of nuts typical of the variety. At the time it was thought that this nut resulted from a cross of Ohio with pollen of the Persian walnut, as it was produced under bag and following hand-pollination. Later growth of the seedling indicated, however, that the pistillate flower was probably pollinated by *J. nigra* before the bagging occurred, since only *J. nigra* characteristics have shown up in the seedling. In 1950, one bud of the *nigra* seedling 40.70-P₁ has almost completely regenerated the top of the tree and

no symptom of the disease is evident. By contrast in 1944, almost all of the top of the tree was occupied by diseased limbs, five in number, of the O'Conner seedling.

Tree Number 854. This tree has shown behavior almost identical with that of Number 838, but three seedlings were topworked instead of one. All three originated from the Coye hybrid and all were budded on July 27, 1944. Less than one month later all buds had produced a foot or more of growth, and one to two scions of each seedling reached sufficient size and vigor to survive the following winter without damage. None of the scions branched in 1944, and all failed to show symptoms of the disease. Early in 1945 profuse branching occurred on the one surviving scion of seedling number 39.03-P₂, and by midsummer excessive proliferation of the buds of primary shoots had resulted in the formation of a mistletoe-like growth characteristic of the disease. Scions of the two other seedlings, 39.03-P₈ and 39.03-P₁₁, were lost by wind damage in midsummer, but at the time they showed no signs of the disease. Most of the shoots of 39.03-P₂ were killed during the following winter, and in April, 1946, the remaining live portions were removed by the Division of Forest Pathology for use in transmission studies.

On August 18, 1944, four patch buds of the O'Conner natural hybrid were placed on one of the main limbs of this tree. One of these buds grew, and in 1950 has come to occupy more than half the top of the tree. The remainder of the top is made up of the original stock tree. There is no evidence of bunching in the tree at present.

Tree Number 411. This tree was budded to six seedlings of the Fox natural hybrid on April 28, 1943. Only one of these lived, 40.45-P₄, and one scion of this seedling in 1950 comprises the entire crown. No symptom of the disease has appeared in this scion, and the tree is healthy at present.

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On April 8, 1944, small lateral limbs of the tree were splice-grafted to two Coye seedlings, 39.03-P₈ and 41.26-P₁₀. One scions of each grew vigorously during the summer, and 41.26-P₁₀ first became chlorotic, then diseased. Seedling 39.03-P₈ became chlorotic but at the end of the season had not shown symptoms of the disease. Both were removed from the tree early in 1945 and the living shoots used for scionwood in transmission studies by the Division of Forest Pathology.

An additional case is *Tree Number 795.* This is a grafted tree of the Graham variety of black walnut that was planted in 1932 within 100 feet of trees of the Bates and Faust varieties of heartnuts. By 1940 the latter trees were heavily infected with bunch disease, but it was not until 1943 or 1944 that symptoms were discovered in the Graham tree. At this time the heartnuts were removed from the orchard. The Graham tree has shown only a few small diseased limbs during the past six or seven years, and in 1950 a fair crop of nuts is in prospect.

Discussion

The following observations should be mentioned briefly before discussing the questions raised by the case histories:

1. Out of more than one hundred seedling scions from 13 hybrids topworked on large *nigra* trees, three have become diseased the first or second year after the scions began to grow on black walnut stock.
2. The three susceptible seedlings have all been grafted on different *nigra* stock trees, and the three stock trees have since regenerated only healthy limbs, after removal of the diseased shoots.
3. Seedlings from a total of 13 natural hybrids between *J. nigra* and *J. regia* have been used, and only two of these hybrids have yielded susceptible seedlings. However, only a few seedlings were available from certain hybrids.
4. A total of 156 trees of approximately 36 horticultural varieties has been grown at Beltsville, and only one tree of the variety Graham has shown well developed symptoms of the bunch disease. Two other Graham trees have shown slight or questionable symptoms of the disease.

It should be pointed out that a considerable number of heartnut and butternut trees were planted at random in the same orchards with the black walnut trees used in these experiments and at the same time (1932). In many cases black walnut trees grew within 50 or 100 feet of the heartnut trees. The bunch disease first appeared on heartnut trees, the most susceptible walnut species, and spread quickly to butternut, which is also very susceptible. By 1940 most of the diseased heartnuts had been removed from the orchards, but it was not until after the top-working experiments described above were completed that the orchards were cleared of all diseased trees. It is therefore possible that insect vectors or other agencies may have spread the disease to the scions of the topworked seedlings from the infected heartnut and butternut trees.

Number 795 is the only *J. nigra* tree on the station farm that has consistently shown symptoms of the disease during the past eight years, and in 1950 only a few limbs are affected. On the basis of the admittedly meager information reported here, it can be stated that the black walnut varieties used in these experiments are more resistant to the bunch disease than are varieties and seedlings of heartnut and butternut. That this is generally true is also borne out by the fact that in the vicinity of Beltsville, Maryland, and the District of Columbia, practically all dooryard trees

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of the Japanese walnut are infected with bunch disease, many of them having already been killed, whereas relatively few black walnut trees in the area show symptoms of the disease.

The suggestion has been made that most varieties and seedlings of black walnut are symptomless carriers of the disease, and only under certain adverse conditions of environment would symptoms appear. This would explain why trees that are cut back severely, as was the case with tree Number 838 described above, show symptoms on the excessively vigorous shoots of the next year's growth.

Little can be said at the present time about the relative resistance of black walnut varieties to the bunch disease because nothing is known about how it is spread from one individual tree to another. The case histories of trees described in the present paper are considered to be worth recording because they show that black walnut trees may support diseased scions and later regenerate apparently healthy tops. In these cases the trees showed a type of resistance to the disease. However, there are many cases known, the majority of which are seedlings, in which black walnut trees became so badly infected with the disease that nut production ceased and the trees later died. Whether the type of resistance described in this paper is widely prevalent in the black walnut as a species will be impossible to determine until more is known about how the disease is spread.

FOOTNOTES:

- [13] Several common names have been applied to this disease, among which "bunch" and "brooming" have most frequently been used. The authors strongly feel that the accepted common name should be "bunch" for the following reasons: (1). The term is very descriptive of the symptoms of the disorder. (2). It is the accepted name of a disease of pecan and hickory species that is very similar if not identical to the one occurring on walnut species. (3). The names "brooming" and "witches'-broom" have already been applied to diseases caused by fungi.
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WEDNESDAY MORNING SESSION

A Forester Looks at the Timber Value of Nut Trees

CHARLES S. WALTERS, *Forestry Department, University of Illinois*

What I am going to say will apply mostly to black walnut since it is one of our most valuable timber trees, but it also will apply to other species like hickory, pecan, persimmon. I've never seen papaw or hazel nut large enough for timber, but the Persian walnut has some value and the Chinese chestnut is a fair timber tree. All of these species should be commercially useful if there is sufficient quality and volume involved to warrant a sale.

What I have to say may not apply five years from now. Persimmon used to be the main source of material for golf club heads and shuttles for the textile industry. It no longer is.

Today golf club heads are being made of "Compreg," a wood which has been impregnated with phenolic resins and cured with heat. The resin is similar to Bakelite. Thin sheets of wood are glued together to build up the head, rather than using a single solid piece, and it makes a considerably better golf club head. The developments in wood use are progressing just as in many other fields. What the wood specialists are trying to do is to take low quality material and change it over to a form which is suitable for many uses for which high-quality expensive material is now used. The timber buyer now wants a tree of long, clean, bole with few knots, of large size, —at least 16 inches in diameter at breast height. In short, he wants high quality material.

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What I am saying may not apply to nut growing. Foresters grow trees for the wood crop, with nuts as a by-product. The first 16 feet of trunk or the butt log is his main interest. It should be completely free of limbs, knots, and other defects for at least 16 feet. You can use the logs above the butt-cut but they usually produce lower grade material.

You have two courses to follow. You can grow wood either in natural stands or in plantations, and the end product is very little different. It is probably easier to grow a high quality tree in a plantation than in the wild. What can be easier than growing a timber tree in the woodlands? It eventually reaches merchantable size and is harvested. Well, nature can do better if you give her help. Your chances of growing a high quality tree to merchantable size are better in the

plantation.

About ten years ago Dr. R. W. Lorenz of our Department made a study of 150 plantations growing on prairie soil in Illinois. Thirty-six were walnut which ranged in age from 22 to 75 years. The one thing we had the most trouble with was determining their ages. One day we stopped at a farm and talked to a farmer, and we asked him when the trees were planted. This man said he could tell us the exact day. "I was a young lad and a neighbor drove by and said, 'Yesterday Abe Lincoln was shot.'" So we had the historical records to determine the age of that particular plantation.

These plantations ranged in number of trees per acre from 46 to 330. The number of trees per acre has a direct influence on the size or diameter growth of the timber tree. An eight by eight spacing, or 680 trees per acre, eventually will be thinned to 200 trees per acre. That gives each tree proper spacing for best height and diameter growth.

The trees ranged in height from about 31 feet to 85, averaging about a foot and a quarter in height each year. The average diameters ranged from about 12 inches to 15 inches. Individual trees, however, ranged up to 24 inches at breast height (4-1/2' above ground level). Each plantation had had very little or no care. If some of them had been cared for, or "managed", their owners would have had a better wood crop—higher quality and higher quantity too.

Now, as to the growth in the managed plantations. We believe it is possible to grow 300 board feet per acre per year. Compared with upland oak, walnut exceeded it in almost all growth factors up to 70 years of age and then they were about the same.

Of the cultural practices, the most important is probably pruning. Sawing off the limbs growing on the trunk makes all wood produced thereafter free of knots. When the trees reach about six inches in diameter, one should select those he is going to call "crop trees"—about 200 of these per acre—and spend his time getting them to timber size and quality. The other trees are removed over a period of several years, so that you finally have only the 200 high quality crop trees left. The reason I suggest starting the pruning when the trees are six inches in diameter, is that that is the size of the veneer core left after the veneer manufacturer has turned the log for the thin sheet of furniture veneer. Remove the limbs and improve the quality so you get a 16-foot log free of limbs and knots. That is what the buyer is looking for.

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I know practically nothing about growing trees for a nut crop, but we seem to have something in common in growing trees both for nuts and timber. Just a lot of it is "horse sense", with a few rules of thumb based upon scientific principles. You must give the crop trees space, give them plenty of room to grow. In the woods they start to grow in a dense undergrowth. The young trees soon reach a height where they begin to dominate their neighbors. There you pick the straight, thrifty-growing trees for crop trees and favor them in your thinning and pruning operations. Tree density influences diameter growth of the trees. In thick stands, trees are usually small and spindly. So plant a large number to give the crop trees good form, then thin the plantation carefully to make it grow.

Grazing and fire are very harmful to tree plantations. Most of the plantations we studied were grazed. A good many were burned. I don't think nut growers would periodically burn their stands to improve the nut production. It is the same with growing a crop of wood. Once the livestock begin to trample or compact the soil, tree growth slows down and when that happens it makes the tree more susceptible to attack by insects and fungi.

As to marketing trees, let's assume you have some material you want to sell. The one thing you want to know is, "how much is it worth?" That is like me asking you what my house is worth. I understand there are persons here not only from Illinois and Iowa, but from New York, West Virginia, Ohio, and Kentucky. Prices on wood products vary not only from state to state but also within a state as well. The things you ought to know are the sizes and the grades of the timber that you want to sell, since they determine price. Now, there are publically employed foresters available to help you. They know your local conditions. The manufacturer's markets determine what he can afford to pay you.

For example, we organized some walnut marketing pools in Illinois during the war. I suppose a half million board feet of Illinois walnut was sold for gun stock material. One company was buying most of the product of the pools. Later we found that this company had a market for low grade stump veneer. Most of the other companies would mark a half dozen trees for their stumps. This company would buy 35 to 40 stumps. Every buyer looked at the same quality and quantity of material, since the trees were all marked. In this case, however, the difference in markets determined the price the manufacturer could pay.

Another thing that concerns price is what we call "logging chance" or how easy is it for the buyer to harvest those trees. I imagine anyone buying trees in Pennsylvania would have considerably more difficulty in getting them out than he would in Illinois. The differences in equipment and methods used to harvest the trees all have a bearing on the price paid the timber owner.

Hickory is commonly sold for handle stock. Wood for striking-tool handles has a definite restriction in the specifications on the number of rings allowed per inch of growth. The Federal Government grades handles on the basis of growth rate. From 17 to 22 growth rings per inch is specified. Timber buyers don't want logs grown any slower than 22 rings per inch and those grown a little faster than ten rings per inch may be acceptable.

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Now, as to determining the trees to sell. I mentioned a 16-inch diameter limit. A few trees

smaller than this with logs shorter than 8 feet in length may be accepted if a large quantity of wood is to be sold. It has to be economically worth while for the buyer to harvest and transport the wood, or he can't afford to buy it. Each buyer of course has a different set of specifications. You ought to measure and *mark* those trees you want to sell and ask the buyers to bid only on those marked trees.

Buyers like to approach the timber owner with, "You have some timber I can use. I'll give you \$100 for what I can use." That is the same approach as if I were to offer \$100 for your entire nut crop. You would probably say, "Let's weigh those nuts so we will have a basis for coming to an agreement." It's the same way with timber. There are two ways you can sell your timber. You can either measure your trees and sell on a volume basis, or you can mark certain trees and state to several buyers, "I have marked 25 trees for sale. What is your best offer for them?" Each buyer looks at the same trees, and you have a common denominator for comparing the fairness of each bid.

For example, we had a farmer in Woodford County, Illinois who had walnut trees, wild trees, but growing in a pasture grove. I jotted down the bids that were made. One buyer offered \$200 for 27 trees, another bid \$225 for 35, a third bid \$265 for 40 or \$165 for 35, and the last buyer offered \$425 for 25 trees. The point I am trying to illustrate is that the farmer, without that extremely high bid, would have been unable to compare the bids because someone bid on 27 trees and someone else on 35 trees. If all buyers had bid on 27 marked trees, he would have had a basis for comparing the bids.

Sell on contract. Farm foresters have simple contract forms which they will give you. The forms can be filled out so that they tell what you agree to do and what the buyer agrees to do. Both parties sign the agreement, so there is less chance for disagreement later.

May I have those slides? (Picture showing large tall tree in dense forest.) This isn't a walnut tree, but I want to show you the kind of condition foresters like to see trees growing under. Nice tall stem, free of any limbs, good diameter. These trees show a rather wide range of age classes. When I talk to my folks about growing timber, they say "70 years is a long time to wait for your money." Here is a tree that started 70 years ago and is ready to be harvested. The crop is sustained yield.

I put this in to show you what we don't like to see. (Picture showing park-like stand of timber.) When these 100 or so trees are gone, there will be no others to replace them. Cattle have grazed this stand to the extent that it will be a long time before any other age classes develop to replace those you see in the picture.

That is a white oak. I told you there weren't many. Good diameter all the way up clear of limbs. When the logger cuts that tree he will have high quality material. The same applies for walnut, hickory, or any other species.

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This walnut tree shows you how to mark trees for sale. One mark up here so the buyer knows which tree is designated for cutting, and one down at the bottom so you can assure yourself that that tree was to be sold. It identifies one of the trees you intended to sell; a penalty is involved for cutting any others.

I wanted to show you what a good walnut stump-cut looks like. These trees should be 18 inches or larger in diameter at about two feet above the ground to be worthwhile. The stump will be cut off when it gets to the mill, and peeled for veneer.

This is one of the walnut plantations cut for gun stock material. I put this in to show you how the buyers cut the trees down, and measure off the logs to get the best grade of material. They aren't interested so much in volume as in lumber. They want the best grade of wood, and they want it in that butt log.

I put these in to show poor quality logs that weren't worth taking. This is an open pasture grown tree. No care or attention given it, so the limbs stayed on and grew quite large.

This shows how they load logs with a tractor and chain. This "cross haul" is a trick of the logger's trade. This is the improper way. The tractor was broken down so it took five or six men to load it because they didn't have the tractor. There are some good logs and here are some poor logs.

This is a group of logs, at a railroad siding. Some look small, but at that time—with the market as it was—they could use the smaller logs. You see some of nice length, good form and free of defects. I mentioned metal. Here's a man with an Army mine detector. They tried them out to locate metal. This company uses this mine detector to test all logs for metal content.

Here's what happens. The metal discolors or stains the wood. This tree probably grew in a fence line. The buyers are just a little reluctant to buy them. If they do they cut them off this high so they are pretty sure all fence wire is left in the stump portion.

In this grove of walnut a wire is nailed on every tree. Such a practice ruins the tree.

This shows wasteful practice. This small mill in southern Illinois was buying these short bolts cut from small trees. Be careful that you don't sell trees that are too small and too young. It is like, I suppose, harvesting your walnuts before the kernel develops.

This is the result of fire. That log, from outside appearance, didn't have a blemish. Loggers left

this part because it was hollow. The infection developed from a fire scar and rotted out the inside.

This shows the same thing. Fire scarred. Bumping machines used to harvest the nut crop or any defect or injury may result in something like this and decrease the tree's value for timber.

I mentioned hickory. Here are some single-trees that are made out of pecan. Hickory is also used. Hickory grows to a commercial size in southern Illinois but in most states it is too small and knotty. One time the Peoria office of the WPB got a release from Washington indicating that hickory was needed for axe handles. They released it to the newspapers. We answered letters for a month after that. Farmers who had hickory they wanted to sell had to be told that there wasn't enough hickory involved to make it commercially possible to market. In addition, there wasn't a single handle mill in the state at that time.

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This is a couple of loads of good walnut logs. They were cut in Illinois and trucked to Indiana to be manufactured into veneer and lumber.

Dr. Colby has asked me if I had any methods of getting rid of stumps. We have worked for five years and we still haven't a method that is economical or easy. We recommend grubbing or burning them out with a small stove, or you can cut them close to the ground and let them rot out. What about the chemicals?—We have worked for a good many years and we have bored stumps until our arms ached, but we haven't found any of them that work.

Discussion

MEMBER: 300 board feet per acre per year?

MR. WALTERS: I said we felt that on good soil and by encouraging nature we can grow that volume.

MEMBER: What are the stumpage prices?

MR. WALTERS: Ranging from about \$10.00 per thousand board feet to \$300. There is quite a span and each grade is different. There is a prime grade, which is the best grade, which must be 16 inches in diameter at the small end at least. Each company has a little different set of grades. Even with the same grade the prices will range according to the size of the log. Maybe a 16 inch prime log may be worth \$200 per thousand board feet and 24 inch will be \$300.

MR. CRAIG: Curly walnut would be worth more?

MR. WALTERS: Yes. It is somewhat of a guess as to whether a tree will have a curly figure. If you let them take the bark off a tree, the buyers can tell. I know of one beautiful stump on which the buyer wanted permission to remove part of its bark to see if it had nubby growth. If it had had the figure, it would have been very valuable. The farmer said, "I don't want you cutting on that tree because if it doesn't have the figure and you don't buy it, the tree will be spoiled." Don't let the buyers chop into the tree to see whether it has figure.

MR. CRAIG: I bought two to get grafting wood.

[Editor's note: Mr. Craig refers to the Lamb curly black walnut, article on which appeared in NNGA 39th Annual Report.]

MR. WALTERS: There has been some work done on grafting or stimulating growth for figure. One method was to beat the trees with a rubber hose and try to stimulate figured or curly grain. Not too much has been published on this work as yet.

MEMBER: Do you think the figure could be propagated by asexual propagation?

MR. WALTERS: I don't know. I will say this; in forest trees, the inherited characteristics are the things we depend upon. If a tree has curly figure and the seed carries that characteristic, you may see it in the progeny. An acquired characteristic I don't think you can depend on so much.

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MEMBER: Is it thought to be acquired or hereditary?

MR. WALTERS: I just don't know whether it is acquired or hereditary.

DR. ROHRBACHER: One thought came to me on this black walnut timber. It's a long pull, and it is one for our posterity. The thought came to be that it is for those of us who are interested in setting up something for our offspring. The plan has been brought out before of using a grafted known name variety of nuts. Plant those, and perhaps those trees as they grow would first give us that wonderful nut which we were looking for.

Symposium on Nut Tree Propagation

F. L. O'ROURKE, *Leader*

MR. O'ROURKE: I believe if you get 10 nut people together, you are going to have eight or nine propagators. It is the one thing that people like to dream and talk about.

I went through the list a little bit, and in order to save some time I wrote a resumé of what had been done. In order to accumulate that material I had to dig into some of the more or less unused volume. There is a wealth of information in some of those earlier reports of the Northern Nut Growers Association.

MEMBER: You can get them for \$15 a set.

MR. O'ROURKE: It's a good investment anyway. At any rate, I think I am going to try to make a bit of an analogy. Suppose this was a church group who had been working on paying off their mortgage. Every once in a while they passed a hat, but instead of dumping that hat on the table they let those contributions accumulate, so that after a while they had the accumulation of 41 years in the hat. Someone has to dump the hat sometime and I tried to do that this summer, and I found all sorts of contributions in that hat. We might say this happened to be the hat. You would find some brand new fresh ten dollar bills, nice new currency, and then you would find some gold pieces (before Roosevelt). They too can be used because they can also be converted. Then you could dig back and come across some stuff, and you didn't quite know what it was. It might be a Spanish doubloon or an old brass button. Right there is where you need a little knowledge. You should be able to tell the difference. I don't know whether I was able to tell that difference. We will, of course, find a lot of slugs and buttons and this and that among the valuable pieces, so possibly we should sift those out and put them in the discard. You never can be sure what to discard.

Just as I said, every nut grower is a propagator at heart. A little wee paragraph may be a lead to something which would be of quite a lot of value.

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This little brief resumé I passed around yesterday, and now this morning I am using my school teacherish techniques in passing around a sheet of paper. There is merely an outline. Pardon me if I insult your intelligence in getting out that outline. As you notice, we start out with the seedling and end with nursery practice. This outline should fit almost any nut species. It should fit chestnut, hickory, walnut or any. I thought it might be best to have a vote as to which one we talk about first, and then we will run down each particular species. I think we should have our panel come up front.

As I said a while ago, we know that practically every person in this room is a propagator. In order that we have this panel conducted in an orderly way, please raise your hand when you speak. I will get the question and pass it to one of the panel members. Which one shall we take up first?

MR. McDANIEL: Let's take the hard one first, the Chinese chestnut.

All right, chestnut. To be systematic, let's talk about seed. Anyone having any difficulty? No trouble at all. Who grows most of the Chinese chestnuts, germinates most of the seed?

MEMBER: I have trouble with rabbits, squirrels, ground hogs.

MR. O'ROURKE: He wishes to know of something to protect his chestnuts.

DR. McKAY: We don't plant in the Fall. I know of one person who uses red lead. We have never used it. I know that has been done. We store our chestnuts in cold storage over the winter and plant in the Spring.

C. S. WALTERS: May I interrupt? We tried 50 chemicals, treating walnut seed with them or putting them on the seed spot after the nut was planted. The squirrels lifted every nut except those that wouldn't have germinated anyway. The rascals knew the difference. We tried allylthiocyanate—"tear gas." The squirrels would dig those nuts up and when the vapor got too strong they would go away and allow it to evaporate. Within two weeks they would come back—maybe two or three times—before they finally took the nut. We tried cayenne pepper and n-butyl mercaptan—the main ingredient in "polecat essence." We had squirrels all over our test plots, and the only nuts they didn't take were the bad ones.

MEMBER: I have had every other kind of rodent. I found I have to plant in the spring and always in a tin can, with rock wool over the nut.

MEMBER: We have used rock wool; planted in the spring. They will get them any time.

MEMBER: I did the same thing with chicken wire and no squirrels got them.

MEMBER: I would like to ask Mr. Chase if he has planted chestnuts on a quantity basis.

MR. CHASE: We planted them on a quantity basis and as some of you know our nursery is adjacent to a wooded area where you would assume there would be a lot of rodents and polecats, both kinds—four and two legged. I made that statement once before about never having had any squirrel damage. We don't have any trouble. We do not lose chestnuts. We mulch with composted mixtures.

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MEMBER. They claim sawdust will help keep them away.

MR. CHASE: On the other hand, a gentleman wanted to get started with chestnut in the Smokies. We helped him get lined up and he planted in beds and these are perhaps a hundred feet long. We mulched heavily with sawdust. The area had been cut over six to eight years ago and had immense piles of sawdust. We mulched with about four inches and some animal got every chestnut out. We never knew what animal it was. There wasn't any evidence on the top. They got

every chestnut which was quite a shock to him. I brought this point out that there *was* danger and he was going to build the bed up high and cover with wire or he was going to get some of this old camouflage netting type and cover that bed for protection both against rodents and early spring frost. He didn't follow through on that so I don't plead guilty.

MEMBER: Does the Chinese chestnut seed have a rest period?

DR. McKAY: For some years we have had a friendly discussion with the Division of Forest Pathology in regard to whether a chestnut seed has a rest period in the same way black walnut, hickory, or some of the others do, and we are not absolutely set in our opinion on the matter. We have the opinion that the Chinese chestnut does not require a rest period. I will tell you that one species, the Alleghany Chinkapin (*C. pumila*) will germinate very readily as soon as it is matured. It will start growing immediately. When you go into the oak species, you have a number like that. They fall to the ground, and put a root into the soil, become anchored, and grow slowly all winter long. We feel that the Chinese chestnuts are of that type. Perhaps the old American chestnut was that way. It fell to the ground in the fall and it sprouted rather promptly within a month or so and grew slowly. Perhaps the Chinese chestnut is not so much inclined that way. We have done this: we have taken them from storage at various times during the winter and planted them, and have never failed to get reasonably good germination. Others have. The results there vary considerably. Perhaps we can't be too sure about the matter. We simply feel that on the basis of what we have seen and observed, they do not have a definite rest period. Many of the failures that have been obtained have been due to poor storage conditions, where the nut started to spoil and perhaps the workers didn't realize it and planted that nut and the nut spoiled immediately. So you fail, not because of the inability of the seed to sprout, but because it was improperly handled and could not grow.

MR. O'ROURKE: Is it not a fact that ... seed has no true rest period as we know it with trees? On the other hand, about 30 days' exposure to low temperature and moist conditions will cause all those seeds to germinate immediately. It may be somewhat the same with chestnut seed.

MR. STROKE: In confirmation, I furnished a man some seed some years ago and we put them in flower pots and they were a foot high by Christmas. [Pg 71]

MR. McDANIEL: The growth is normal from the immediate planting, too. You don't get the suppressed growth later, as in prematurely germinated peach.

MEMBER: The chinkapins will often sprout even before they come out of the bur.

MR. CRAIG: I might say this concerning the California Persian walnuts. Take one at harvest and plant it, and that seed will germinate immediately. You hold it in dry storage and plant in the spring and it will come up in a couple of weeks. I speak from experience.

DR. CRANE: The same thing is true with pecan, in west Texas and Arkansas and California. We have lots of trouble with pecans germinating. It is not uncommon to find a pecan germinated with a root as much as ten inches long grown in the hull. If that nut goes through to maturity and becomes dry, then there is an appreciable delay in germination. They won't germinate as quickly. There has got to be a lot of changes in the kernel after they have once dried out and been harvested before germination will be initiated again.

DR. McKAY: In connection with this question of germinating nut seeds of all kinds, we think it is very important to plant the seed in a well aerated medium. I think that is a mistake many people make. If the soil happens to be of a clay nature, it keeps out oxygen and air and the sprout will rot. That is the reason why, when we plant chestnut seed, we like to plant in sand or the same with any nut seed. Coarse sand has a lot of air in it. That nut has a high demand for oxygen.

MEMBER: In the matter of chestnut seed, don't put too many layers of seeds. One is better than two. Even in rather porous soil, they seem to develop gas. Anyway, I found the bottom ones didn't get enough air and they rotted, whereas on top they didn't. It is better to plant a single layer than more.

MR. SHERMAN: What is the best method of treating the chestnut seeds in the fall to prevent the development of weevils?

DR. McKAY: Of course, there are several ways of treating the nuts for weevils. One is the old hot water method. All of us can heat water. We have to heat it to about 120 degrees. So hot, you can't hold your hand in it. Immerse thirty minutes for an average size nut. Now in connection with the spoilage and rotting that is another matter. We believe in harvesting chestnuts promptly, storing them before they dry out. We of course store our chestnuts in cans. Cans with lids and holes punched at either end.

MR. O'ROURKE: Are there any other questions pertaining to seeds?

MEMBER: I would like to caution persons outside the weevil belt about being very careful if you get nuts that may be infested. Leave your nuts in a small jar and you have the advantage of watching the weevils actually emerging. You can pick the nuts out about February, and you can select all the nuts that are sound. Once in awhile a weevil will live through the winter. One thing we should all be thinking about is that the nurseryman has to produce grafted trees in order to fill a demand, and those nut trees must be produced cheaply and he must use methods which are highly efficient. [Pg 72]

MEMBER: Has anyone tried to deep freeze?

DR. CRANE: We tried that just this past winter. For a couple of years back one individual had asked us why we didn't freeze them. Last winter we did. We stored three gallon buckets at two temperatures. One at zero and the other at ten degrees below—hard freezing temperatures. Those nuts stayed frozen from early October until the next April. We brought them out and examined them one morning. The first thing we did was taste them. Those nuts we ate when first opened and you could tell them from no other chestnuts. They were nice eating, sweet. We let those chestnuts thaw evenly at room temperature. That evening we examined them and it's hard to describe what the transformation was in those nuts. In the first place was the deterioration that had gone on as soon as the tissue thawed ... They were dripping water. The tissue had burst and the water just flowed. On the other hand, about an hour after they thawed out, when we first examined them just as they thawed out, you would be amazed at how tender they were. They would melt in your mouth. Freezing apparently breaks down the tissue. The tissue is as soft as it can be. Apparently this freezing transformed some of the starch to sugar. The rub is that it won't keep for even two or three hours.

MEMBER: They might keep if you put them in the soil first.

DR. CRANE: The tissue is ruined.

MR. O'ROURKE: We have now decided certain things pertaining to seed germination. Then we are confronted with the problems of seedling versus clonal rootstocks. I do not know whether or not there have been clonal rootstocks selected for Chinese chestnut. I am sorry to have to ask Dr McKay to talk again but he knows more about it.

DR. McKAY: I can only tell you about the experiment we started this spring on clonal stocks of chestnuts. We have just this year's results. Unfortunately we didn't get good results. We took ten seedling trees. We used nursery trees, large five-year old trees, with vigorous root system, ten seedlings, and got from them 20 roots. We took roots the size of your finger with a lot of feeding roots, and we grafted onto those five times four. We took four per variety. We used five varieties of chestnuts, and all five of those each had four pieces and we had ten of those seedlings. We wanted to find out whether any of those ten seedlings would give us a better set of these five varieties than any other trees. In other words, we are trying to get a start on a clonal rootstock. We used a splice graft. We simply took a piece of scion and spliced it right on the end of the root. We had four of those in the bundle, and we had five per seedling and we had ten of them. That made 20 in all. We planted in a cold frame, with cheesecloth covering to keep the temperature from getting too high. Eventually, if this thing works, we will establish a clonal line. We planted those ten original trees but you will be surprised. We can go back to the original tree if we succeed with clonal lines, so a chestnut variety we hope will be grafted on a line of stock that came from that one original tree. Bear in mind this is the method and it remains to be seen whether it is going to work for chestnuts.

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The results are discouraging. Only one or two seedlings gave us six or 8 successful grafts on all the five varieties but by that method of trying all five of these varieties on all ten of the seedlings we hope to get a start. We will try them again, and we hope to get at least a start that will work. It may be that we will have to start over again. We may want to take ten other seedlings. That is, in brief, our work so far in that direction.

We took it off the ground. We didn't have long enough side roots.

MEMBER: How about mound layering?

DR. McKAY: We tried cutting off at the ground level and mounding up those sprouts and tried to root them, with no satisfactory results. There was just a small amount of rooting.

MEMBER: Did you try layering?

DR. McKAY: One year we did, but with no success.

MR. McDANIEL: I have seen a few layered successfully but it's a little slow.

MR. O'ROURKE: Shall we move to vegetative propagation and consider cuttings first?

DR. McKAY: Just one thing I think ought to be mentioned at this time. We know that even the use of clonal rootstocks does not entirely eliminate variability. All the work that has been done with these Malling apple stocks shows that, as far as apples are concerned. Now we have an idea which, in a crop like chestnuts, may have very far reaching influence and we feel quite hopeful for it. That is growing seedling progenies of certain parent trees. I want to tell you our experience with it. We started our work on breeding and selection of tung nuts in 1938, and we have tested now over 600 parent trees that were especially selected. Out of those six hundred we have released a total of six horticultural varieties, for asexual propagation. But out of those six we have three trees, the seed of which will produce seedling progenies that come very true to the type of the parent tree. One of those released we know as the Lampton variety. It will produce from 95 to 100 per cent of its seedlings, that are so true to type that you can identify them in the nursery. At the end of the first season you plant 95 to 100 per cent of the remaining trees in the orchard and anybody can identify the trees.

In the case of budded trees we have the variability of the rootstocks, which affects the growth. Since that particular variety has been released there has not been one single nut of that variety

crushed. Every single seed is grown to tree size, to plant in a new orchard. It has taken us 12 years to reach that stage, but that one variety is probably the most outstanding thing we have. There is a slight variation in the trees but not as much as you have in other trees.

Now, with Chinese chestnuts, we planted seedlings that were grown from the seed of a parent tree at Beltsville. We planted a thousand trees. There were seedlings grown from seed produced by different parent trees. Out of those thousand there wasn't a single one outstanding. Yet in one lot of seedlings which was planted in Georgia, every one of the seedlings grown from the seeds of that selected tree produced such high quality nuts that we haven't cut out a single tree. There just hasn't been any off types. Now we have gone a step further. We had one called selection 7932 which came into bearing very early. We have had those trees grown from seed. The seedling at three years of age produced a pound of nuts, the seedling having the characteristic of its mother. We have hopes that before many years we shall be able to produce parent trees or clonal lines in which the seed taken from those line and planted will give us uniform seedlings.

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I don't want you folks to get the idea we have these parent trees or seed from them that are available. I mention it because a lot of you are growing chestnut trees and planting them from seed. You could make a great contribution if you would take the nuts from each individual tree and plant separately, so that you will know in the future the origin of every one of those seedling trees you have. Some of these days someone is going to find one that is going to give us seedling trees that are good and free from variation.

Elberta peach seed will come practically true to variety from seed, except minor variations of size, shape, color and season. In a peach you are facing a very highly specialized market. But with the Chinese chestnut, color is not so important. What we are interested in is trees that bear and have enough uniformity so that we don't have pee-wees by one and jumbos by another.

We need very badly this sort of thing. We need chestnut varieties planted in pairs in isolated places. Any of you folks could do a great service if you will let us know wherever trees occur in pairs, or just two varieties and no others, and then we know that one variety pollinates the other. When you have a mixed planting of a half dozen varieties the male is promiscuous. Therefore you have a much greater mixing of genetic factors. If we have a pair of trees, we get a much more uniform breeding group of seedlings.

MEMBER: How far removed from other varieties do they have to be?

DR. McKAY: Half a mile or a mile.

MR. O'ROURKE: I think we can go to vegetative propagation of cuttings. I think that we have any amount of evidence that Chinese chestnuts can be rooted from cuttings, but can trees grow on from rooting cuttings?

DR. CRANE: You have summed up the situation perfectly.

MEMBER: Just by accident, in our storage house a couple of chestnuts fell over into a pile of peat moss and they did make roots.

MR. CORSAN: Would you call the Chinese chestnut a second?

MR. O'ROURKE: We should confine this only to propagation. While there are any number of interesting phases of it, we have to stick to propagation or we will never get through. We have had remarks on layers. Any comments on layers?

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Let's move on to graftage. We want to have our chestnut produced on a quantity basis so I am going to ask Mr. Bernath to tell us a good method.

MR. BERNATH: I don't graft too many outside, but I do my propagating in the greenhouse. I had more than a thousand graftings growing, some of them this high [indicating] which greatly depends upon the root system and the condition of the soil. I think that is the fastest and easiest way of grafting chestnuts. I do my grafting sitting down.

MEMBER: That's on the potted stock.

MR. BERNATH: That's right.

MEMBER: After you have produced all these grafts, what are you going to do with them?

MR. BERNATH: Sell them.

MR. STROKE: I tried to contact some nurseries. They are selling your seedlings, little chestnut trees for \$1.75 and they want to give you 75¢ or a dollar for grafted ones.

MR. O'ROURKE: Mr. McDaniel has received a letter from Mr. Hirschi from Oklahoma City and there is one paragraph that I think the membership will be interested in. [Letter from Mr. Hirschi is partly reproduced here.]

Oklahoma City, Okla.
Aug. 23, 1951

Mr. J. C. McDaniel,
Urbana, Ill.

My Dear Mac;

... In my work with chestnuts I believe I have had an experience that will be interesting to the membership. As you well know I am a strong believer in selected named varieties. I do not regard seedling chestnuts any more valuable than seedling peaches or apples. The—Nursery, a member of our association, have been customers of mine for a long time. Last year I persuaded them to catalog seedling chestnuts at about half the price of Nanking, Meiling, Kuling, and Abundance. I was anxious to learn the attitude of the public, where they had an opportunity to buy and plant selected grafted varieties, when heretofore only seedlings were available. To my utter amazement the seedlings did not sell at all, but the thousand trees of selected varieties were sold out long before the season was over. I could not supply more, neither could I get them elsewhere. So far as I know Max Hardy and I are the only ones grafting chestnuts in quantities.

It is amazing the volume of business that catalog nurseries do. For instance the above firm does a million dollars gross business annually, and many others do a big business. All would be glad to catalog grafted chestnuts, and the chestnut movement would grow by leaps and bounds. True, they would have to be sold to them at wholesale prices, but they want small sizes, parcel post sizes preferred, which can be produced the second year from seed. Plant the seed in March, the next March graft them, and by fall the grafts will range from three to seven feet as shown by the enclosed photos.

I had the same experience with the above firm with Carpathians, sold them 500, which were sold out long before the season ended and I could not get them any more. They have ordered 2500 for this coming season. Unfortunately we had a poor take on grafts this spring due to cutting scion wood after a November freeze, which killed all other English walnuts. Carpathian wood was not hurt except where used for scions. Where left on the trees they forced out as usual and are producing a good crop of nuts.

I must close. I know you will have a wonderful meeting and I wish I could be with you. I will be with you in spirit, and in the meantime will be doing all I can to promote interest in nut growing.—Very truly yours, A. G. Hirschi.

MR. GERARDI: I don't yet have the greenhouse. I depend on field grafting. I produce my own seedlings. I just use seed from those three best trees. They run pretty uniform as far as growth is concerned. I bark graft in the field, when the buds begin to swell nicely and from there on. You can get a growth like that. [Indicating four to 5 feet.] [Pg 76]

MEMBER: He has the same thing. Just as soon as the buds swelled. Sometimes I do go to the trouble if I am covering more ground, to cut them off as soon as they start to swell. A chestnut will peel again in four days. I start in after about four days and set these grafts and I use this bark graft. I have a sample of the method here. This is the plain bark graft which is efficient and fast for the production of chestnuts in quantity. I have to get into bigger production. I am trying to make speed and I am using this method. To start, the first week of April, when the buds start. If I get it done, it's the first week or the second of April.

MR. GERARDI: Four days on chestnuts. In my personal opinion after a few years observation I don't believe it is absolutely essential to cut back. Sometimes weather conditions will be a big factor. Sometimes the temperature is around forty and remains that way four or five days. The weather has taken the place of your cut back. That doesn't always happen, but weather conditions sometimes favor this.

MEMBER: What percent of failures do you expect on a hundred?

MR. GERARDI: Well, it is better to take a thousand trees. Out of a thousand you miss 35 or 40. The percent that takes is high. This is an important factor; you must have good wood. You are running just a little on the small size. From a quarter of an inch up to—. I never set a scion over about 9/16. That is just getting into the rough ... It's hard on the tool and rootstocks.

MEMBER: Do you wax the graft?

MEMBER: By all means you use the proper wax.

MEMBER: Did you ever try not to?

MR. GERARDI: Yes, if favorable weather permits. I use this Acme compound. Last season, it was a little stiff and I mixed a little oil and it cut my rubber bands too quick. That brush wax is about as good as you can get, but customers come in and I am called away and someone is always interfering with the work. I was trying to get a wax that I could just drop and it would be ready when I picked it up again. It is beginning to be an assembly line production. You can go faster if you have a helper or two to do the tying and waxing.

MEMBER: I have a rather crude scion storage method. I have dug out in a hill a reservoir that I keep ice in. If you could keep it at 32 to 40 degrees from the time it is cut in February, or the first part of March and then store it in this until the grafting time, it will keep readily.

MEMBER: In California I built a little house and there was room enough to put in at least 40 bushel boxes, 900 pounds of ice and I packed grafting wood in boxes and kept it until July.

MEMBER: The ice keeps up the humidity.

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MEMBER: There are a lot of successful methods. It is what is available for you.

MR. WILKINSON: I have had very little experience in propagation of chestnuts. Mine has been limited. I shoulder my scions. I like to shoulder. My percentage of take varies with the conditions, sometimes it's fairly good and sometimes not so good. I have a specimen union of two inches in diameter and you can see what a nice union it makes. Ordinarily I have had very good success with chestnut grafting.

DR. MCKAY: We have done some work on budding chestnuts but it hasn't been successful. We have had indefinite results. As Mr. Stoke says, grafting is so much more simple. We realize more work should be done on budding. We simply do our propagating the way it is easiest. Until the time comes that we have got more information on budding we will go along as we do now. One of the difficulties is that the wood is fluted and it is hard to get a good bud fit. It doesn't make for a good fit. We carried out a little experiment on one year old seedling at the crown. There is a smooth area on the stem as it enters into the root condition. It is a perfectly smooth area and we tried putting sealed buds at that point. We have had good success in putting those kinds of buds in at the time when you would ordinarily bud fruits, in the fall, where growth conditions are still good. Another year we did that same work and we didn't succeed so well. So we don't know exactly what we did wrong. In order to keep a set from those buds we don't know just what the conditions should be.

MR. O'ROURKE: To summarize then, the two successful methods are the greenhouse method and the field method used by Mr. Gerardi.

MR. STROKE: I mostly use a plain splice. The cut is about four times as long as scion diameter, if it is on a stock of the same size. It is the best method. I use also a modified cleft graft with a little trimming. Mr. Jones brought out that modified cleft graft and I have made a little change. Here is the stock, and a modified cleft graft is a side graft with the stock top cut off. You cut in at an angle far enough and you put your scion in here and there is your modified cleft graft. You get contact on all four lines. It takes experience and judgment. You cut your scion wedge and then make your understock cut and you will seldom make a mistake after you get experience. That is a side graft and a modified cleft graft. That makes a flexible portion here and you get a fit on both sides. But with the ordinary cleft graft, if you go to the end of your stock you still have a split and not a perfect fit.

MEMBER: Would you explain that? If your scion is not the same size it might over lap or ... how do you handle that?

MR. STROKE: If the scion is undersized, you don't cut so deep. Sometimes the stock is a little oversize. You simply cut less deep in your stock. If you have a large stock and small scion I'd make a bark graft.

MEMBER: I should like to bring up one point. That is produce more nut trees and do it cheaper. It seems to lie between Mr. Gerardi and Mr. Bernath. Mr. Gerardi can set between six and seven hundred per day, and tie them himself, and Mr. Bernath will graft between seven hundred and a thousand a day with someone else doing the tying.

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MR. CHASE: We have tried all these grafting methods with varying degrees of success. Our propagation experiments at Norris have been directed at the development of more economic methods.

Conifer grafts are often placed in a grafting case for rapid callusing. This year we tried some black walnut grafts and found that they callused in 10 to 14 days when placed in a grafting case. These were bench grafted on piece roots, using modified cleft and side grafts. Later we tried chestnut with excellent results. Then we made more chestnut grafts, wrapped them in damp moss and placed them in a lab oven with a temperature of approximately 75 degrees. These callused rapidly and were planted immediately in the nursery. They made good growth.

We think that some adaptation of this method has possibilities in our region. Often our chestnut grafts are damaged by late spring frosts. If we can bench graft, callus, and then hold the grafts until favorable weather, frost damage will be eliminated. It may be possible to handle black walnut in some similar fashion. Then we would be dealing only with successful grafts. A cold frame provided with heating cable should be adequate.

Factors Affecting Nut Tree Propagation

F. L. O'ROURKE, *Department of Horticulture, Michigan State College*

Propagation of nut trees is primarily involved with the problems affecting the perpetuation of selected clones by vegetative means. It has been indicated by Morris (14), Reed (18), and others that trees produced from seed are of inferior value for nut production. Seed propagation,

however, must be practiced to produce the necessary rootstocks upon which the selected varieties are budded or grafted.

Seed Propagation

Barton (1) indicated that while some few seedlings may be produced without prior seed stratification, after-ripening of the seed for 2 to 4 months at 35° to 50° F. markedly increased seedling production with hickory and walnut. Chase (4) found that black walnut seed sown in November yielded more and larger seedlings than when planted at a later date. Chase (5) also reported that nuts containing larger kernels produced larger seedlings, and that planting 1 to 2 inches beneath the surface yielded larger seedlings than deeper placement. There have apparently been little or no observations made on the performance of seedlings for rootstock purposes between different parental strains except for Chinese chestnut as reported by McKay (12).

Clonal Rootstock Propagation

The difficulty of propagating any selection of nut trees by vegetative means has discouraged selections for rootstock purposes. Only filberts offer such an opportunity for selection on somewhat the same basis as the East Malling clones of apple rootstocks which produce different sized scion varieties after grafting. Unfortunately, no non-suckering desirable clones of filberts have yet been reported and even the non-suckering Turkish tree hazel is grown from seed when such rootstocks are used (16).

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Propagation by Cuttings

Gellatly (7) quoted the success of the East Malling Research Station in England in rooting cuttings of walnuts grown in the greenhouse and reported on his own experience in producing short roots on dormant cuttings of heartnut and Persian walnut. The writer (15) has occasionally produced roots on softwood cuttings of pecan and hickory set in a mist humidified greenhouse but the cuttings did not survive. Mist humidification has been a distinct aid in retaining foliage on softwood cuttings of filbert and Chinese chestnut until roots were formed but unless the axillary buds were developed sufficiently to make new growth immediately thereafter, little or no survival was secured. Apparently when the cuttings were succulent enough to form roots the buds were too immature to put out new shoots. If one waited until the buds were developed the tissue at the base of the cutting was too highly lignified for root formation. The use of synthetic plant hormones on cuttings of nut-tree species has been of questionable value.

Propagation by Layers

Mound layers are used quite successfully for the propagation of filbert varieties but have not proven of value with other nut-tree species. Chinese chestnut has been reported to layer easily but experiments with both mound and trench layers of selected varieties of this species at the Glenn Dale, Maryland Station of the U.S. Department of Agriculture gave negative results. The writer (15) has occasionally rooted pecan, hickory, and Chinese chestnut by aerial layering. A marcot box containing sphagnum moss kept moist by a glass wick immersed in water from a bottle at the lower end was employed. The time and labor involved were so great that the experiments were discontinued.

Propagation by Grafting

Bench grafting of walnuts and hickories has been adequately described by Bernath (3), Hardy (8), Lounsberry (10), Slate (24), and others. This method has been tested on a commercial basis and apparently should be considered as one of the most efficient ways to produce nut trees quickly and cheaply in large quantities. Greenhouse and storage facilities are required and keen expert attention must be given the newly-made grafts to assure success.

Reports on top-working and field grafting are both numerous and voluminous. Morris (13), MacDaniels (11), Wilkinson (29), and others have demonstrated the value of cutting back the stock a week or more before setting the scion in order to avoid injury from excess flow of sap. Reed (17), Stoke (27), Morris (14), Shessler (21), Sitton (23), and others have described methods of preparing and setting scions in the stock. All writers agree that greater success is secured when dormant scions are set relatively late in the season. Becker (2) stated that greater success was secured when scions were set from time leaves were full-grown until catkins fell. Protection of the scion by waxes, paper bags, and shading has been advocated by Morris (14), MacDaniels (11), Shelton (20), Shessler (21), and others.

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Propagation by Budding

The shield or T bud has not been considered suitable for thick-barked trees such as hickory and walnut due to the difficulty of preventing "air-pockets" beneath the bark. Shaving the edges of the bark at the side of the shield may eliminate this difficulty. Joley (9), reported variable success in shield budding of walnut in California. Patch budding, either by the annular method or with

the Jones patch-budding tool was described by Reed (17), and is reported by Chase (6), Zarger (30), and others to be the most practical method of propagation with walnuts. Pecans and hickories are commonly patch-budded in summer in commercial nurseries. The thin-barked Chinese chestnut is usually budded by the shield-or T-bud method as reported by Hardy (8) and McKay (12).

Scion and Budstick Handling

Sitton (22) reported that two-year wood of black walnut was superior to either older or younger wood. MacDaniels (11) advocated the base of the scion to be in the two-year wood and the tip in the one-year wood.

Shelton (19) reported that scions could be kept moist until used by storing in a closed container with a small amount of sodium sulphate, commonly known as "Glauber's salt". The usual method of scion storage is to pack in moist but not wet peat or sphagnum moss and place in a refrigerator at about 35° F. Waxes and resins have been used successfully to prevent undue loss from the plant tissues while in storage.

Waxes and Dressings

Propagators seldom agree in their choice of a wax and wound dressing. In a series of carefully controlled tests, Sitton (23), found that a rosin and beeswax mixture with a filler gave results with pecans superior to the so-called "cold waxes" or asphalt emulsions. Paraffin and polyvinyl resin are often used for scion covering and to protect newly set buds. Shelton (20) has indicated certain qualities of a satisfactory wax.

The Rootstock Problem

In the Pacific Northwest Painter (16) stated that some Persian walnut varieties on *Juglans hindsii* (the northern California black walnut) develop a fatal graft blight due to delayed incompatibility at about 20 years of age. This is the so-called black-line disease. McKay (12) found great differences in survival of buds of Chinese chestnut placed on five seedling strains and Hardy (8) suggested that more attention should be paid to the parental relationship of stock and scion in the chestnut. Weschcke (28) reported that black walnuts grafted on butternuts yielded poor crops and that bitternut was a satisfactory stock for shagbark varieties and shagbark hybrids. Smith (25) advocated shagbark stocks for shagbark varieties but found bitternut to be practically as good. Stoke (26), and Smith (25) found eastern black walnut to be the best stock for all walnut species, including heartnuts and butternuts.

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Nursery Practices

Commercial nurseries have adopted various methods to discourage the normal tap-rooting habit of nut trees and stimulate lateral and fibrous root production. Planting seed over screen wire, undercutting the seedling each year in the nursery row, frequent transplanting, and root pruning are methods commonly used. Attention must be given to the production of an adequate root system to help the grafted tree withstand the shock of transplanting to its permanent location.

Summary

The chief obstacle to the large scale growing of selected nut varieties is the difficulty in propagation. Careful workers with a background of knowledge and experience and skilled in craftsmanship are successful in a limited way. Quantity production is apparently dependent upon specialized facilities and efficient labor programs. The need for extensive rootstock research is keenly felt by growers of walnut, hickory and chestnut.

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Nut Rootstock Material in Western Michigan

HARRY P. BURGART, *Union City, Michigan*

It is only natural that those who propagate by budding and grafting are always hoping to find a rootstock that will accept their scions with the highest percentage of takes and impart vigorous growth to the scion variety. Sometimes in our eagerness to adopt a new rootstock we are likely to neglect a vital point, namely—Future Performance of the root-top combination we are about to use.

It would take years of observation in a test planting to prove whether or not a new rootstock material is safe to use. A rootstock can affect the tree it supports in various ways. Sometimes the rootstock will force to the top too much growth, which is likely to bring about unfruitfulness. In other cases, the rootstock may cause a dwarfing habit in the future tree, with the resulting top being a scant producer of nuts. Then there is the combination where rootstock and top vary too much in their growth rate, thus making an unsightly tree. The ideal rootstock is one that attains a diameter nearly equal to the diameter of its partner, and is capable of producing a moderate amount of top growth, together with the production of heavy crops of nuts. Such a rootstock

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should also accept buds or grafts readily, and be compatible with the scion throughout the life of the tree.

My first experience with rootstocks for grafting came about in 1926 when I was working at the J. F. Jones Nursery then at Lancaster, Pennsylvania. Mr. Jones used both bitternut and pecan seedling stocks for grafting shagbark hickories. Pecans and hicans were also grafted on hardy northern pecan seedlings, and Japanese walnut stocks were used for butternuts and heartnuts. Black and Persian walnut scions were set on eastern black walnut seedlings.

When I returned to Michigan I brought back enough of Mr. Jones' trees for a small test planting here at Union City. These trees were planted in a heavy quack grass sod and some were lost, but those surviving show good compatibility between the top and root.

In the intervening years I have made but slight changes in the rootstock material used in my own nursery. I do not approve of the performance of our butternut varieties on the Japanese walnut *root*, as it results in a weak and dwarfed tree. The use of butternut rootstocks is also unsatisfactory, for they tend to produce trees of low vitality that in a few years fall victim to blight and then perish. I tried our Michigan black walnut seedlings as a rootstock and found that they are very much better rootstock material. The growth at the union is about equal. Top growth is good, and the butternut tops bear early and heavily, with no signs of blight during the ten years I have had them under test.

After years of test I have decided to use the northern pecan seedlings as rootstocks for my shagbarks, pecans, and hicans because they are a fast growing stock tree. They accept the grafts readily, and make good unions more quickly than the bitternut stocks I have tried. Mr. Wilkinson, from whom I obtain my seed, has never failed to send me seed with good viability, just about every seed germinating. The northern pecan seedlings have shown no winter injury here in Southern Michigan during the 20 years I have watched them growing.

An example of the superiority of the black walnut over the Persian walnut as a rootstock is a seedling of the variety Wiltz Mayette growing near a Broadview grafted on black walnut. Both trees are the same age, but the Broadview on black walnut is just about twice the size of its own-rooted neighbor.

Hudson Valley Experience with Nut Tree Understocks

GILBERT L. SMITH, *Millerton, N. Y.*

This report is not based on any planned or well conducted experiments, but is based simply on our observations of results of our grafting work over the years since 1934.

Our first work was with hickories, so I will start with them.

Our first year's grafting was done in a plot of practically pure pignut stocks. This was the seven leaflet pignut, which I believe to be *Carya glabra*. I have never been sure of the identification of the two species of pignuts. We secured a fairly good percentage of living grafts, which grew well the first summer. The next spring all of the grafts failed to leaf out and later were found to be dead. A few grafts which were put on bitternut stocks (*Carya cordiformis*) grew well, and are still growing well after more than fifteen years. Several different varieties of shagbark hickory scions were used in this grafting.

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The second year, we again grafted as many or more stocks in this same area. The results were exactly the same, except that we used some scions of Davis and Fox. (These varieties were brought to light through the contests of the previous winter). The grafts of Davis grew on pignut stocks, are still alive and doing fairly well. They have been bearing for several years, although the squirrels have stolen all of the nuts. Grafts of all other varieties which were on the pignut stocks died the next spring. One graft of Fox on mockernut lived and has continued to grow fairly well. That same year we started our test orchard of shagbark stocks (*Carya ovata*) in a different area. Grafts on these stocks have grown very well.

I believe that for some reason grafts of shagbark on pignut stocks cannot stand cold weather. Certainly, incompatibility is very marked.

Our experience with hickory stocks to date is as follows:

PIGNET (*Carya glabra* or possibly *Carya ovalis*). This species is worthless as a stock for shagbark, shellbark, and hybrids of these species. If nut growers have some pignut stocks growing where they especially wish to have some good hickory trees, they can graft them to Davis. We have also heard that Brooks will grow on pignut stocks.

MOCKERNUT (*Carya alba*). This species is also nearly worthless as a stock for shagbark, shell bark, and hybrids, although many more varieties will live on it than will on pignut stocks.

SHAGBARK (*Carya ovata*). This species makes the most dependable stock of any we have tried so far, for shagbark, shell bark, and the hybrids. Its greatest drawback is the long time it takes to grow seedlings to a size large enough to graft.

SHELLBARK (*Carya laciniosa*). We have never had an opportunity to use this species as a stock. I think that it would make a good one and possibly be faster growing than shagbark.

BITTERNUT (*Carya cordiformis*). We have found that this species makes a very satisfactory stock for shagbark and hybrid grafts. We have not tried shellbark on it, except Berger which grows well on it. Seedlings of this species are much faster growing than are shagbark seedlings, and thus are large enough to graft sooner. We have grafts growing on bitternut stocks since 1935, they are growing and producing well. We consider this species as good or nearly as good as shagbark as a stock.

We have received contrary reports from farther south. These may be due to stock being blamed for something they did not cause or it may be that bitternut stocks grown from seed of more southern origin may not be as good as our northern stock.^[18]

PECAN (*Carya pecan*). Our experience with this species as a stock is very limited and has been confined to grafts of only one variety of shagbark (Wilcox). Results were very disappointing, but we have been told by others that it makes a good stock. It is much faster growing than is shagbark.

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Walnut

In walnut grafting, we have found that the eastern black walnut stocks are so much superior to any others we have been able to find, that we have discarded all others.

BUTTERNUT (*Juglans cinerea*). We have found that it is much harder to secure living grafts on this stock than on black walnut. It also attracts butternut curculio to the nursery.

JAPANESE WALNUT (*Juglans sieboldiana* and variety *cordiformis*). We have found that seedlings grown from either of these species are a great attraction to the butternut curculio. They are more difficult to secure living grafts on, and grafts on these stocks are very definitely less hardy than similar grafts on black walnut growing side by side. We have proved this repeatedly.

PERSIAN WALNUT (*Juglans regia*). We have never used this species as a stock, and in view of the fact that grafts of it grow so well on black walnut stocks, I can see no use in even trying it.

EASTERN BLACK WALNUT (*Juglans nigra*). As stated above, we have found this to be the ideal stock for all walnut grafting. It is more free from insects than any of the other walnuts. Grafts grow well on it and are more hardy than grafts on some of the others.

We have not had enough experience in grafting chestnuts and filberts even to offer any comment as to stocks for them.

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FOOTNOTES:

[18] The planting location perhaps has more influence than the seed source. At any rate, the poorest growing pecan in the University of Illinois orchard is on a Wisconsin bitternut understock.—J. C. McD.

The 1950 Persian Walnut Contest

SPENCER B. CHASE, *Contest Chairman, Tennessee Valley Authority, Norris, Tennessee*

The nationwide Persian Walnut Contest conducted by NNGA in 1950 attracted 33 entries from 11 states. The contest was judged by H. L. Crane, L. H. MacDaniels, and H. F. Stoke, assisted by S. B. Chase.

The entries were first evaluated independently by the judges. Then each judge made a second evaluation with the knowledge of the findings of the other two judges. The Chairman then arbitrated the differences of opinion among the three judges. This action amounted only to the placing of four entries after the first prize had been unanimously agreed upon.

The following table shows the results of the contest:

Results of 1950 Persian Walnut Contest

Prize Entry	Submitted By	Nut Weight	Kernel Weight	Kernel Percentage
1. 030	Mrs. W. H. Metcalfe, Webster, New York	11.9	6.5	54.5
2. 011	(Hansen) S. Shessler, Genoa, Ohio	.8	5.8	58.5
3. 002	(McKinster) Roy McKinster, Columbus, Ohio	12.5	6.4	51.2

4. 012	(Jacobs) S. Shessler, Genoa, Ohio	12.9	6.0	47.0
5. 006	Lewis Weng, Dayton, Ohio	12.4	6.4	51.9

*Honorable
Mention*

001	Mrs. Gale Harrison, Pemberton, New Jersey	14.7	6.2	42.2
008	A. C. Orth, Dayton, Ohio	14.7	6.7	45.8
014 (Burtner)	Fayette Etter, Lemasters, Pennsylvania	10.4	4.6	44.4
016 (S-66)	G. L. Smith, Millerton, New York	15.1	6.8	44.9
025	P. F. Countryman, Ontario,	13.9	6.3	45.3
031 (Colby ^[19])	A. S. Colby, Urbana, Illinois	10.8	5.9	54.1
032 (S-M-9)	Royal Oakes, Bluffs, Illinois	15.8	6.6	41.5
033	S. Elwell, Homer, Michigan	19.2	8.3	43.2

A brief history of the prize-winning trees follows:

Entry 030: A Carpathian originally obtained through the Wisconsin Horticultural Society in 1936 (Rev. Crath's selections). In 1950 this tree was 14 years old, 22 feet high, with a trunk circumference of 23 inches. It has withstood 18 degrees below zero without damage. The tree began bearing a few nuts in 1947, 4 quarts in 1948; 1 peck in 1949; and 1/2 bushel in 1950.

Entry 011: This is the Hansen variety which was given second place in the 1949 contest. The origin of this tree is uncertain. It is estimated to be 50 years old and 25 feet high. It has withstood 15 degrees below zero without damage. Just when this tree began bearing is unknown, but it produced 2 bushels in 1947; 3 pecks in 1948; 1 bushel in 1949; and 3 bushels in 1950.

Entry 002: This is the McKinster variety which was judged the best entry in the 1949 contest. It is a Carpathian originally obtained through the Wisconsin Horticultural Society in 1939 (Rev. Crath's selections), and was 11 years old in 1950. It is 29 feet high with a circumference of 22 inches. It has withstood 17 degrees below zero without injury. This tree began bearing in 1943. In 1947 it produced 1/2 bushel; 1 bushel in 1948; 3 pecks in 1949; and 3 pecks in 1950.

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Entry 012: This is the Jacobs variety which placed third in the 1949 contest. The nut which produced this tree originally came from Germany some 70 years ago. It has withstood 15 degrees below zero without injury. This is a large tree which has been bearing since 1915. It produced 300 pounds in 1947; 100 pounds in 1948; 200 pounds in 1949; and 200 pounds in 1950.

Entry 006: A Carpathian originally obtained through the Wisconsin Horticultural Society in 1936 (Rev. Crath's selections). In 1950 it was 14 years old, 25 feet high, with a circumference of 30 inches. It has withstood 10 degrees below zero without injury. This tree began bearing in 1949; in 1950 it produced 15 pounds of nuts.

It should be emphasized that this contest was based entirely on nut characteristics. In another year the placing of the same entries might be considerably different, because of seasonal variation. However, it is significant that the McKinster, Hansen, and Jacob varieties which were among the prize-winners in the 1949 contest were also among the prize-winners in 1950.

Contests such as this are valuable as a first step in the selection and development of improved varieties. The prize-winners and those given honorable mention are all very promising hardy Persian walnuts. The next step will be to test these selections to determine their adaptability to our varying conditions.

Colby, a Hardy Persian Walnut for the Central States

J. C. McDANIEL, *Extension Horticulturist, University of Illinois*

When the Reverend Paul C. Crath of Toronto imported walnut seeds and scions from his native Ukraine region and adjacent areas of Poland in the 1920s, he started a chain of propagation and selection which promises to establish the Persian walnut (*Juglans regia*) as a commonly grown nut in southern Ontario and the north central states. The best of his importations, and seedlings from them, are fruiting in such states as Wisconsin, Iowa, Illinois and Missouri, showing in many cases a degree of hardiness which must reverse the conclusion of an older generation of pomologists that Persian or "English" walnuts were too tender for successful cultivation in most of the middle west.

The time has now arrived when there are enough fruiting trees of the "Crath Carpathian" walnut seedlings in many states that comparisons can be made and the more promising ones named and disseminated for propagation. The nuts which the Reverend Mr. Crath imported in greatest quantity during the middle 1930s came from more than 100 different seedling trees selected in Poland. Their seedlings exhibit much variability in characters of trees and nuts. Some are much

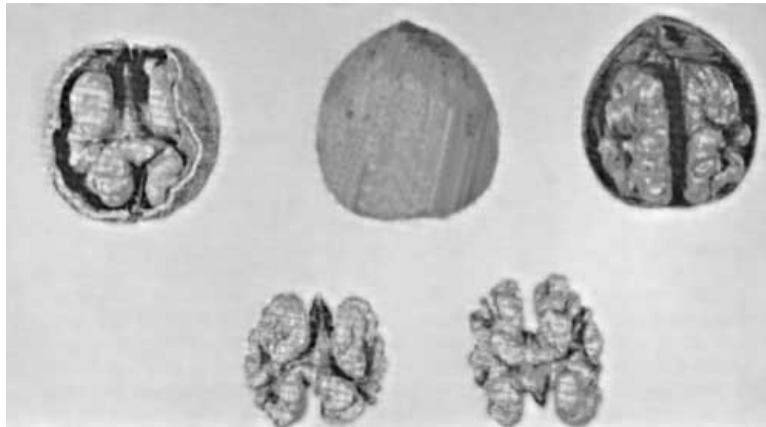
less hardy than others under our conditions. Not all are as large fruited as their seed parents (and some of the parent trees bore small nuts). Though many have smoother shells than Mayette or Franquette, there is also much variation in shape, thickness, and color of shells. Color and flavor of kernel vary from tree to tree. The season of nut maturity, though variable, is generally early enough in locations where the trees are winter hardy. The parents were selected for good filling of kernels, and this character generally has carried over to the seedlings fruited in America. As with other walnuts, some of the Carpathian seedlings are apparently more susceptible than others to fruit damage by the husk maggot. Walnut blight has infected them in some localities.

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The COLBY Persian walnut, named in August 1951, and released to nut nurserymen for propagation early in 1952, is the best to date of thirteen Carpathian seedlings (each from a different parent tree) planted at the University of Illinois Agricultural Experiment Station from 1937 to 1939. It is the first Persian walnut variety to be named at this station.

The name, Colby, honors Dr. Arthur S. Colby of the Department of Horticulture at the University of Illinois, who has been in charge of nut investigations here since 1919. It was given to this variety, with his permission, by members of the Northern Nut Growers Association during their 42nd Annual Meeting, held at Urbana in August, 1951. Dr. Colby is a former president of the Northern Nut Growers Association.

Colby is a seedling of the tree designated as Crath No. 10. The seed was collected in 1934 from the parent tree near Cosseev, in the Carpathian mountain region of southern Poland as then constituted, planted in the nursery of S. H. Graham, Ithaca, New York, and the seedling transplanted to Urbana, Illinois at the age of two years. It has been fruiting annually here since 1942, with crops of up to 1-1/4 bushels in recent years. The accompanying cut shows nuts of the 1951 crop, a little less than 2/3 natural size. They are thin shelled, like the parent Crath No. 10, well filled with kernels of rich flavor, and are medium in size for varieties of this species.



Colby walnuts of 1951 crop, showing thin shells and plump, bright kernels.

The Colby tree is rather upright in growth, with strong branches, being the most vigorous among the four hardiest Carpathian seedlings at Urbana. It was one of two trees on which most catkins survived the winter of 1950-51, when temperatures at Urbana fell to -19° F. It is among the earliest Persian walnuts to start growth in spring, blossoming at Urbana normally in the first half of May. Flowering is protandrous (male flowers first) but with enough overlap of staminate and pistillate blossoms to secure a large degree of self-pollination from the abundant large catkins. Fruit set might be improved, however, by planting nearby another variety with later staminate catkins.^[20] The nuts mature from the middle to the last of September and have not been seriously affected by walnut husk maggot or walnut blight at Urbana. The tree is relatively early in wood maturity, shedding its foliage usually before November, a characteristic shared by the other hardiest Carpathian seedlings in Illinois.

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Prior to 1952, scions of the Colby walnut (previously designated Illinois No. 10) were propagated for test by top working on native eastern walnut (*Juglans nigra*) at two widely separated locations. It fruited in 1951 at Greensboro, North Carolina, where the early growth sometimes is injured by spring freezes. (This is common with Carpathian walnuts in the southeast.) It has survived three winters at Sabula, Iowa with no cold injury and made unusually vigorous growth there. At both Urbana and Sabula, it has been compared with Broadview Persian walnut, a British Columbia origination considered a hardy variety. Broadview has often suffered winter injury at both locations, and in 1950-51 was killed to the understock at Urbana.

The suggested test regions for the Colby Persian walnut include those with a climate similar to central Illinois, and where spring freezes are not generally a problem. The suggested understock is black walnut (*J. nigra*) though established hardy Carpathian and other Persian walnuts may be satisfactory for top working.

Additional wood for propagation of the Colby will be available in small quantities next August to nut nurserymen and other experiment stations. (Walnut scions cannot be sent from Illinois to California.) Trees of Colby should be available from several cooperating nurseries in the fall of 1953.—Reprinted from *Fruit Varieties and Horticultural Digest*, 6(4):72-75. 1952.

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FOOTNOTES:

- [19] Named since the close of the contest.—ED.
- [20] According to U.S.D.A. workers in walnut breeding, pollen of other *Juglans* species is not to be depended upon for securing a set of fruit on this species. Several hardy Persian varieties of good quality which have won awards in recent contests are being propagated but have not been grown at Urbana. These include the Lake, McKinster, and Metcalfe among others of Carpathian parentage, and two non-Carpathian varieties, Hansen and Jacobs, which have been fruitful in northwestern Ohio. Before one or more of these can be recommended as a pollinator for the Colby walnut, however it will be necessary to have them flowering in the same orchard for a period of several years.

Among the other Carpathian walnuts which have flowered in the orchard containing the original Colby tree, there is one very hardy seedling, R 5 T 27, which in 1951 and 1952 produced abundant pollen at the proper time to pollinate the Colby. Tree R 5 T 27 an open pollinated seedling of Crath No. 23, is protandrous, but later flowering than the Colby with respect to pistils as well as catkins, and consequently most of its pistillate flowers fail to set fruit in years like 1951 when there was no later Persian walnut pollen available. The R 5 T 27 tree produces an attractive, smooth shelled nut slightly smaller than that of Colby, not quite as sweet in flavor, and slightly earlier in maturity. Because of its hardiness and apparent value as a pollinator for Colby, propagating wood from this R 5 T 27 walnut tree will be available to experimenters, but we do not plan to name it at present.

Resolutions

Mr. President and members of the Northern Nut Growers Association. The Northern Nut Growers' Association, assembled in its forty-second annual meeting here at Urbana, Illinois, on this the 29th day of August, 1951, desires to express its appreciation and thanks to Dr. George D. Stoddard, President of the University of Illinois, and to Dr. H. P. Rusk, Dean of the Agricultural College, to Dr. C. J. Birkeland, Dr. A. S. Colby, Professor J. C. McDaniel, and other members of the Department of Horticulture, as well as to other members of the staff of the University for the excellent accommodations provided for the entertainment of the members attending and for the meeting place provided, and to Mrs. A. S. Colby and other for their entertainment of the ladies and for the refreshments furnished. Therefore, be it resolved that the Secretary spread this resolution upon the minutes of the Association and send copies to President Stoddard, Dr. Birkeland, and Dr. and Mrs. A. S. Colby.

In the passing of Harry R. Weber, who was a nut culturist, one of the oldest members of the Association, and a past president, we have lost not only a real leader and worker in this Association, but also a very dear friend. This Association is greatly indebted to him and he has been deeply missed at this meeting. Therefore, be it resolved that the Secretary of this Association spread upon the record of this meeting this resolution and send a copy to Mrs. Weber

Signed, Members of Resolutions Committee

- (s) H. L. Crane, *Chairman*
(s) F. L. O'Rourke
(s) Spencer Chase

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Northern Nut Growers Association Membership List

As of July 29, 1952

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** Honorary member
§ Contributing member
± Sustaining member

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Wade, Clifton, Forest Avenue, Fayetteville. **Attorney**
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Buck, Ernest Homer, Three Arch Bay, 16 N. Portola, South Laguna
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Serr, E. F., Agr. Experiment Station, Davis. **Associate Pomologist**
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Wagner, A. S., Delhi, Ont.

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Daniels, The Honorable Paul C., American Ambassador, American Embassy,
Quito

ENGLAND

Baker, Richard St. Barbe, The Gate, Abbotsbury, Weymouth, Dorset. (**Founder, Men of the
Trees.**)
Commonwealth Bureau of Plant Genetics, School of Agriculture, Cambridge. (**Exchange.**)
The Gardeners Chronicle, London. (Exchange.)

FLORIDA

Avant, C. A., 940 N.W. 10th Ave., Miami. **Real Estate, Loans. (Pecan orchard in Ga.)**
Estill, Gertrude, 153 Navarre Dr., Miami Springs. (Summer address under Mich.)

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GEORGIA

Hardy, Max, Leeland Farms, P. O. Box 128, Leesburg. **Nurseryman, farmer**
Hunter, Dr. H. Reid, 561 Lake Shore Dr. N.E., Atlanta. **Teacher, nut farmer**
Noland, S. C., Box 1747, Atlanta 1. **Owner, Skyland Farms**
Wilson, William J., North Anderson Ave., Fort Valley. Peach and pecan grower

HAWAII

Keaau Orchard, John F. Cross, Manager, P.O. Box 1720, Hilo. **Macadamia growers**

HOLLAND

Institute for Horticultural Plant Breeding. Herenstraat 25. **Wageningen. (Exchange)**

HONG KONG

* Wang, P. W., c/o China Products Trading Corp., 6 Des Voeux Rd., Central

IDAHO

Dryden, Lynn, Peck. **Farmer**
Horn, Anton S., 920 N. 20th St., Boise. **Ext. Horticulturist**

ILLINOIS

Allbright, R. D., Allbright Nurseries, 4237 Western Avenue, Western Springs
Allen, Theodore R., Delavan. **Farmer**
Anderson, Ralph W., R.F.D. 3, Morris
Andrew, Col. James W. (See California)
Anthony, A. B., Route No. 3, Sterling. **Apiarist**
Baber, Adin, Kansas
Barrow, J. M., P.O. Box 209, Urbana. **Architect, University teacher**
Best, R. B., Eldred. **Farmer**
Booth, Earl, R.F.D. 2, Carrollton
Blough, R. O., Route No. 3, Polo
Blyth, Colin R., Math. Dept., U. of I., Urbana. (Farm in northern Ontario)
* Boll, Herschel L., 2 Hort. Field Lab., Univ. of Ill., Urbana. **Asst. in Pomology**
Borchsenius, Wayne L., R.F.D. 2, Sheridan
Brock, Arthur S., 1733 North McVicker Ave., Chicago 39
Canterbury, C. E., Cantrall. **Seed Grower**
Churchill, Woodford M., 4323 Oakenwald Ave., Chicago 5
Colby, Dr. Arthur S., U. of Illinois, Urbana
Dahlberg, Albert A., D.D.S., 5756 Harper Ave., Chicago 37
Daum, Philip A., North Sixth St., Carrollton
Dietrich, Ernest, Route No. 2, Dundas. **Farmer**
Dintelman, L. F., State Street Road, Belleville
Douglass, T. J., 309-1/2 North St., Normal
Eigsti, Dr. O. J., Funk Bros. Seed Co., Bloomington. **Research Botanist**
Estill, Mrs. Harry, Power Farms, Cantrall
Fordtran, E. H. Route No. 2, Box 197-A, Palatine

Frey, Frank H., 2315 W. 108th Place, Chicago 43. **Asst. to V. P., CRI & P RR.**

Frey, Mrs. Frank H., 2315 W. 108th Place, Chicago 43. **Housewife**

Fuller, Owen H., 1005 Oneida Street, Joliet

Gerardi, Louis, Route No. 1, Caseyville. **Nut and fruit nurseryman**

Glidden, Nansen, West Lincoln Highway, DeKalb

Grefe, Ben, Route No. 4, Box 22, Nashville. **Farmer**

Heberlein, Edwin W., Route No. 1, Box 72A, Roscoe

Hermerding, Ted, c/o Russell Miller Milling Company, Jerseyville

Hockenyos, G. L., 213 E. Jefferson St., Springfield. **Business man**

Jennings, Charles L., Box 321, Grayville

Jungk, Adolph E., Route No. 1, Jerseyville, Illinois

Kammarmeyer, Glenn, 1711 E. 67th St., Chicago 49

Knoeppel, J. A., Bluffs

Kreider, Ralph, Jr., Route No. 1, Hammond. **Farmer**

Langdoc, Mildred Jones (Mrs. Wesley W.) P. O. Box 136, Erie.

Nursery, farm, housewife

McDaniel, J. C., c/o Hort. Field Lab., U. of I., Urbana. **Horticulturist. (Sec'y of Ass'n.)**

McDaniel, J. C., Jr., Urbana

Marsh, Mrs. W. V., Route 2, Aledo

Moeser, William W., Route 1, Belleville

Musgrave, Carl, 419 W. 61st Street, Chicago 21. **Machinist**

Newman, Roy, P. O. Box 51, Martinsville. **Orchardist**

Oakes, Royal, Bluffs (Scott County)

Pierson, Stuart E., Carrollton. **Bank President**

Pray, A. Lee, 502 N. Main St., LeRoy

Price, Harold G., Sr. (See Utah)

Reisch, Louis C., Route 4, Carrollton. **Farmer**

Robbins, W. J., 885 N. LaSalle St., Chicago 10. **Insurance**

Robertson, Virgil E., Virginia. **Retired farmer**

Schubert, Kenneth, Rt. 1, Millstadt

Sokolowski, F. W., M.D., 2503 Donald Ave., Alton

Sonnemann, W. F., Experimental Gardens, Vandalia. **Lawyer, farm operator**

Sparks, Maurice E., 1508 Ash, Lawrenceville

Spencer, H. Dwight, 275 W. Decatur St., Decatur. **Attorney**

Vortman, Elmer, Route 1, Bluffs

Wahle, Fred, Route 1, Fieldon

Warnecke, Martin H., 714 South First Avenue, Maywood

Whitford, A. M., Farina. **Nurseryman**

Zethmayr, Gordon, Route No. 1, Box 130, West Chicago

INDIANA

Aster Nut Products, Inc., George Oberman, Mgr., 1004 Main St., Evansville

Bauer, Paul J., 123 S. 29th St., Lafayette

Bolten, Ferd, Route 3, Linton. **Farmer, fruit grower. (Carpathian walnut seeds.)**

Boyer, Clyde C., Nabb

Buckner, Dr. Doster, 421 W. Wayne St., Ft. Wayne 2. **Physician and Surgeon**

Clark, C. M., C. M. Clark & Sons Nurseries, Route 2, Middletown. **Nurseryman, fruit farmer**

Cole, Charles W., Jr., Madison Rd., Rt. 6, Box 112A, South Bend

Coleman, Robert G., **Field Editor, The Indiana Farmer's Guide**, Huntington

Cunningham, Earl E., 612 E. 4th Street, Anderson

Dooley, Kenneth R., Route No. 2, Marion. **Gardener**

Eagles, A. E., Eagles' Orchards, Wolcottville. **Walnut grower, apple orchardist**

Eisterhold, Dr. John A., 220 Southwest Riverside Drive, Evansville 8. **Medical Doctor**

Fateley, Nolan W., 26 Central Avenue, Franklin. **Auditor and cashier. (Carpathian walnut seeds.)**

Glaser, Peter, Route No. 9, Box 328, Koering Road, Evansville

Grater, A. E., Route 2, Shipshewana

Harrell, Franklin M., Route 1, Griffith

§ Johnson, Hjalmar W., Rt. 4, Valparaiso. **V. P. Inland Steel Co.**

Kaufman, Ray, Route 4, Peru

Kodera, Shunzo, Goshen College, Goshen

Kyburz, Benjamin E., Route 1, Idaville

Neimeyer, Harry D., West Lebanon. **High school principal and farmer**

Newman, Jesse D., Jr., R. R. 2, Culver

Pape, Edw. W., Route 2, Marion

Prell, Carl F., 1414 E. Colfax Avenue, South Bend 17. Office: 821 J.M.S. Bldg., South Bend 1.

Treasurer of Ass'n.

Reed, Frank, Daleville. **Toolmaker**

Richards, E. E., 2712 South Twyckenham Drive, South Bend. **Studebaker Corp.**

Risko, A., Tioga Orchards, Monticello

Russell, A. M., Jr. 2721 Marine St., South Bend 14

Skinner Dr. Chas. H., Rt. 1, Thorntown

Sly, Miss Barbara, Route No. 3, Rockport

Sly, Donald R., Route 3, Rockport. **Nurseryman, nut tree propagator**

Wallick, Ford, Rt. 4, Peru

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Ward, W. B., Horticulture Bldg., Purdue University, Lafayette. **Ext. Horticulturist,**

Vegetables

Westerhouse, George F., East Ohio Street, Monticello

Whitsel, Gilbert L., Jr., 515 S. 15th Street, Lafayette

Wichman, Robert P., Route No. 3, Washington. **General farming**

Wilkinson, J. F., Indiana Nut Nursery, Rockport. **Nurseryman**

IOWA

Berhow, Seward, **Berhow Nurseries**, Huxley

Boice, R. H., Route No. 1, Nashua. **Farmer**

Carlson, R. J., M.D., 2025 College Street, Cedar Falls

Cole, Edward P., 419 Chestnut Street, Atlantic

Eads, Carroll, R.F.D., Miles. **Farmer**

Ferguson, Albert B., Center Point. **Nurseryman**

Ferris, Wayne, Hampton. **President of Earl Ferris Nursery**

Greig, John E., Box 157, Estherville

Huen, E. F., Eldora. **Farmer**

Inter-State Nurseries, Hamburg. **General nurserymen**

Iowa Fruit Growers Assn., c/o Sec'y, State House, Des Moines 19. **Cooperative buying**

organization

Kaser, Mrs. J. D., Winterset

Knowles, W. B., Box 476, Manly

Kyhl, Ira M., Box 236, Sabula. **Nut nurseryman, farmer, salesman**

Lysinger, Addison, Lamoni

Martzahn, Frank A., Route No. 1, Davenport. **Farmer**

McLeran, Harold F., Mt. Pleasant. **Lawyer**

Orr, J. Allen, 535 Frances Bldg., Sioux City 17

Rohrbacher, Dr. William, 811 East College Street, Iowa City. **Practice of Medicine**

Schlagenbusch Brothers, Route No. 2, Fort Madison. **Farmers**

Snyder, D. C., Center Point. **Nurseryman, nuts and general.**

Snyder, Paul V., Kalona

Tolstead, W. L. See Nebraska

Wade, Miss Ida May, Route No. 3, LaPorte City. **Bookkeeper**

Welch, G. L., Mt. Arbor Nurseries, Shenandoah

White, Herbert, Box 264, Woodbine. **Rural Mail Carrier**

Williams, Wendell V., Route No. 1, Danville. **Farmer**

KANSAS

Baker, Fred C., Troy. **Entomologist**

Borst, Frank E., 1704 Shawnee Street, Leavenworth

Breidenthal, Willard J., Riverview State Bank, 7th and Central, Kansas City 1. **Bank President**

Funk, M. D., 600 W Paramore Street, Topeka. **Pharmacist**

Gray, Dr. Clyde, 1045 Central Avenue, Horton. **Osteopathic Physician**

Harris, Ernest, Box 20, Wellsville. **Farmer**

Leavenworth Nurseries, Carl Holman, Proprietor, Route No. 3, Leavenworth. **Nut nurseryman**

Mondero, John, Lansing

Stark, M. F., Hawthorne Place, Hiawatha. **Supt. City Schools**

Thielenhaus, W. F., Route No. 1, Buffalo. **Retired postal worker**

Underwood, Jay, Riverside Nursery, Uniontown

Wales, Max, 1534 MacVicar Street, Topeka

KENTUCKY

Alves, Robert H., 302 Clay St., Henderson

Armstrong, W. D., West Ky., Exp. Sta., Princeton. **Horticulturist**

Bray, Terrell, Bray Orchards, Bedford

Hopson, J. R., Route 2, Cadiz

Magill, W. W., Horticulture Dept., U. of Ky., Lexington

Miller, Julien C., 220 Sycamore Drive, Paducah

Moss, Dr. C. A., Williamsburg. **Bank President**

Rouse, Sterling, Route No. 1, Box 70, Florence. **Fruit grower, nurseryman**

Shakelford, Thomas B., P. O. Box 31, Compton

Taliaferro, Philip, Box 85, Erlanger

Tatum, W. G., Route 4, Lebanon. **Commercial orchardist**

Usrey, Robert, Star Route, Mayfield

Walker, William W., Route No. 1, Dixie Highway, Florence

Widmer, Dr. Nelson D., Lebanon

LOUISIANA

Hammar, Dr. Harald E., USDA Chemical Lab., 606 Court House, Shreveport 47. **Chemist**

Perrault, Mrs. Henry D., Route No. 1, Box 13, Natchitoches. **Pecan grower**

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MARYLAND

Case, Lynn B., Route 2, Box 208, Federalsburg
Crane, Dr. H. L., Bureau of Plant Industry Station, Beltsville. **Principal Horticulturist, USDA.**
Eastern Shore Nurseries, Inc., P. O. Box 743, Easton. **Chestnut growers**
Graff, George U., Harding Lane, Rt. 3, Rockville
Gravatt, Dr. G. F., Plant Industry Station, Beltsville. **Research Forest Pathologist**
Hodgson, William C, Route No. 1, White Hall. **Farmer**
Kaan, Dr. Helen W., 8335 Grubb Road, Silver Spring. **Research Associate**
Kemp, Homer S., (Proprietor) Bountiful Ridge Nurseries, Princess Anne
McCollum, Blaine, White Hall. **Retired from Federal Government**
McKay, Dr. J. W., Plant Industry Station, Beltsville. **Government Scientist**
* Negus, Mrs. Herbert, 5031-56th Ave., Roger Heights, Hyattsville
Porter, John J., 1199 The Terrace, Hagerstown. *Farm Owner*
Quill Farm, Barclay
Shamer, Dr. Maurice E., 3300 W. North Avenue, Baltimore 16. Physician

MASSACHUSETTS

Babbitt, Howard S., 221 Dawes Avenue, Pittsfield. **Service station owner and part time farmer**
Bradbury, H. G., Hospital Point, Beverly
Brown, Daniel L., Esq., 60 State Street, Boston
Bump, Albert H., P. O. Box 275, Brewster
Davenport, S. Lothrop, 24 Creeper Hill Road, North Grafton. **Farmer, fruit grower**
Faulkner, Luther W., R.F.D., Westford
Fitts, Walter H., 39 Baker St., Foxboro. **General foreman, instrument company**
Ganz, Dr. Robert Norton, 262 Beacon St., Boston
Kendall, Henry P., Moose Hill Farm, Sharon
Kerr, Andrew, Lock Box 242, Barnstable
La Beau, Henry A., North Hoosic Road, Williamstown. **Stat. engineer**
Murphy, John D., 19 Boulevard Rd., Wellesley
Rice, Horace J., 5 Elm Street, Springfield. **Attorney**
* Russell, Mrs. Newton H., 12 Burnett Avenue, South Hadley
Stewart, O. W., 75 Milton Avenue, Hyde Park 36
Wellman, Sargent H., Esq., Windridge, Topsfield. **Lawyer**
Weston Nurseries, Inc., Weston
Wood, Miss Louise B., Pocassett, Cape Cod
Viera, Manuel, Main Street, Vineyard Haven

MICHIGAN

Andersen, Charles, Route No. 2, Box 326, Scottsville. **Nurseryman**
Barlow, Alfred L., 13079 Flanders Avenue, Detroit 5. **Sec'y of Mich. Nut Growers Assn.**
Becker, Gilbert, Climax
Boylan, P. B., Route No. 1, Cloverdale. **Homesteader**
Bumler, Malcolm R., 2500 Dickerson, Detroit 15. **Insurance trustee**
Burgart, Harry, Michigan Nut Nursery, Box 33, Union City. **Nurseryman**
Burgess, E. H., Burgess Seed & Plant Company, Galesburg.
Burr, Redmond M., 320 S. 5th Avenue, Ann Arbor.

General Chairman, The Order of Railroad Telegraphers, Pere Marquette District, C&O Ry. Co. [Pg 97]

Cook, Ernest A., M.D., c/o County Health Dept., Centerville
Corsan, H. H., Route No. 1, Hillsdale. **Nurseryman**
Dennison, Clare, 4224 Avery, Detroit 8
Drake, Virgil, Route No. 2, Bangor 2
Emerson, Ralph, 161 Cortland Avenue, Detroit 3
Estill, Miss Gertrude. (See under Florida, Summer Address: Route 4, Box 762, Battle Creek)
Hackett, John C., 3321 Butterworth Rd., S.W., R. R. 5, Grand Rapids 6
Haesler, L. M., Route No. 4, Box 130, South Haven
Hagelshaw, W. J., Route No. 1, Box 394, Galesburg. **Grain farmer, contractor**
Hay, Francis H., Ivanhoe Place, Lawrence. **Farmer**
Kennedy, Robert M., 45354 Deneweth Rd., Mt. Clemens
Korn, G. J., c/o Mrs. Arthur Howell, Onaway
Lee, Michael, P. O. Box 16, Milford
Lemke, Edwin W., 2432 Townsend Ave., Detroit 14. **Engineer, nut orchardist**
McCarthy, Francis W., Box 392, Algonac
Miller, O. Louis, 417 N. Broadway, Cassopolis. **Forester**
O'Rourke, Prof. F. L., Hidden Lake Gardens, Tipton. **Professor of ornamental horticulture, Mich. State College**
Pickles, Arthur W., 760 Elmwood Avenue, Jackson
Prushek, E., Route No. 3, Niles. **Plant breeding**

Ricky, Lowell L., 1009A Birch, East Lansing
Schmidt, Wilhelm G., 22037 Poinciana, Detroit 19. **Printer**
Sherman, L. Walter. See Ohio
Simons, Rev. R. E., Flat Rock
Somers, Lee, Route No. 1, Perrinton. **Farmer-nurseryman**
Sweet, Dale V., 530 South Capitol, Lansing
Tate, D. L., 959 Westchester St., Birmingham
Ullrey, L. E., 1209 Cambridge Drive, Kalamazoo 27
Wyman, Miles L., 40 North Street, Highland Park 3. **Certified Public Accountant**

MINNESOTA

Dubbels, Charley, Elgin
Hodgson, R. E., Dept. of Agriculture, S. E. Experiment Station, Waseca
Hormel, Jay C., Austin
Wedge, Don, R.F.D. 2, Albert Lea. **Wedge Nursery**
Weschcke, Carl, 96 S. Wabasha St., St. Paul. **Proprietor Hazel Hills Nursery Co.**

MISSISSIPPI

Gossard, A. C., U. S. Hort. Field Station, Route No. 6, Meridan. **Associate Horticulturist, USDA**

Meyer, James R., Delta Branch Experiment Station, Stoneville. **Cytogeneticist (cotton)**

MISSOURI

Bauman, Ivan T., Bauman Brokerage Co., 4350 Taft Avenue, St. Louis
Biggs, Dutton, 248 Elm Avenue, Glendale 22
Degler, Roy H., 1305 Moreland Avenue, Jefferson City
Hay, Leander, Gilliam
Howe, John, Route No. 1, Box 4, Pacific
Huber, Frank J., Weingarten. **Farmer**
James, George, James Pecan Farms, Brunswick
Logan, George F., Oregon
Nicholson, John W., Ash Grove. **Farmer**
Ochs, C. Thurston, Box 291, Salem. **Foreman in garment factory**
Owens, LeRoy J., Willow Springs
Richterkessing, Ralph, Route No. 1, St. Charles. **Farmer**
Rose, Dr. D. K., 230 Linden, Clayton 5
Sims Fruit and Nursery Farms, Hannibal
Stark Bros. Nursery & Orchard Co., Attn. Mr. H. W. Guengerich, Louisiana
Stephens, A. F., G.M. & O.R.R., 721 Olive Street, St. Louis. **Gen. Agr. Agt.**
Wuertz, H. J., Route No. 1, Pevely

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NEBRASKA

Brand, George, Rt. 5, Lincoln
Caha, William, 350 W. 12th, Wahoo
Hess, Harvey W., The Arrowhead Gardens, Box 209, Hebron
Sherwood Jack, Nebraska City
Tolstead, W. L., Department of Botany, University of Nebraska, Lincoln

NEW HAMPSHIRE

Demarest, Charles S., Lyme Center
Lahti, Matthew, Locust Lane Farm, Wolfeboro. **Investment banker**

NEW JERSEY

Anderegg, F. O., Pierce Foundation, Raritan
Blake, Harold, Box 93, Saddle River
Bottoni, R. J., 41 Robertson Road, West Orange. **President of Harbot Die Casting Corp.**
Brewer, J. L., 10 Allen Place, Fair Lawn
Buckwalter, Mrs. Alan R., Route No. 1, Flemington
Cox, Philip H., Jr., 30 Hyde Rd., Bloomfield
Cumberland Nursery, William Wells, Proprietor, Route No. 1, Millville. **Nurserymen**
Donnelly, John, Mountain Ice Company, 51 Newark St., Hoboken
Dougherty, William M., Broadacres-on-Bedens, Box 425, Princeton. **Secretary, U. S. Rubber Co.**
Ellis, Mrs. Edward P., Strawberry Hill, Route No. 1, Box 137 Keyport
Kass, Leonard P., 82 E. Cliff St., Somerville
Lamatonk Nurseries, A. S. Yorks, Proprietor, Neshanic Station. **Nut Nursery**
Lippencott, J. C., 15 Mundy Ave., Spotswood
McDowell, Fred, 905 Ocean Avenue, Belmar
Parkinson, Philip P. (See Quill Farm, under Maryland)
Ritchie, Walter M., Route No. 2, Box 122-R, Rahway
Rocker, Louis P., The Rocker Farm, Box 196, Andover. **Farmer**
Sheffield, O. A., 283 Hamilton Place, Hackensack. **Dun & Bradstreet**
Sorg, Henry, Chicago Avenue, Egg Harbor City. **Manufacturer**

Van Doren, Durand H., 310 Redmond Road, South Orange. **Lawyer**
Williams, Herbert H., 106 Plymouth Ave., Maplewood

NEW MEXICO

Gehring, Rev. Titus, Box 117, Lumberton

NEW YORK

Barton, Irving, Montour Falls. **Engineer**

Bassett, Charles K., 2917 Main St., Buffalo. **Manufacturer**

Beck, Paul E., Beck's Guernsey Dairy, Transit Road, East Amherst. **Dairy Executive**

Benton, William A., Wassaic. **Farmer, and Sec'y, Mutual Insurance Co. Partner in Benton & Smith Nut Nursery**

Bernath, Stephen, Bernath's Nursery, Route No. 3, Poughkeepsie. **Nurseryman**

Bernath, Mrs. Stephen, Route 3, Poughkeepsie

Bixby, Henry D., East Drive, Halesite, L. I. **Executive V.P., American Kennel Club, N. Y.**

City

Brook, Victor, 171 Rockingham Street, Rochester 7. **Sales Engineer**

Brooks, William G., Monroe. **Nut tree nurseryman**

Bundick, Clarkson U., 35 Anderson Ave., Scarsdale. **Mechanical engineer**

Caldwell, David H., N. Y. State College of Forestry, Syracuse. **Instructor in wood technology**

Carter, George, 428 Avenue A, Rochester 5

Cassina, Augustus, Valatie, Columbia County

Feil, Harry, 1270 Hilton-Spencerport Road, Hilton. **Building contractor**

Ferguson, Donald V., L. I. Agr. and Tech. Institute, Farmingdale

Flanigen, Charles F., 16 Greenfield St., Buffalo 14. **Executive manager**

Freer H. J., 20 Midvale Rd., Fairport. **Typewriter sales and service**

Gibson, Stanford J., 56 Fair Street, Norwich

Glazier, Henry S., Jr., 1 South William St., New York 4

Gould, Mrs. Gordon, 419 East 56 Street, New York 22

Graham, S. H. Bostwick Road, Route No. 5, Ithaca. **Nurseryman**

Granjean, Julio. (See Denmark)

Hasbrouck, Walter, Jr., 19 Grove St., New Paltz. **Post office clerk**

Hill, Francis S., Sterling. **Letter carrier on rural route**

Iddings, William A., 1931 Park Place, Brooklyn 33

Irish, G. Whitney, Fruitlands, Route No. 1, Valatie. **Farmer**

Kettaneh, F. A., 745 Fifth Ave., New York 22

Knipper, George M., 333 Chestnut Ridge Rd., Churchville

Knorr, Mrs. Arthur, 15 Central Park, West, Apt. 1406, New York

Kraai, Dr. John, Fairport. **Physician**

Larkin, Harry H., 189 Van Rennselaer Street, Buffalo 10

* Lewis, Clarence. (Retired)

Lowerre, James, Route 3, Middletown

* MacDaniels, Dr. L. H., Cornell University, Ithaca. **Head, Dept. of Floriculture and Ornamental Hort. (President of the NNGA.)**

Metcalfe, Mrs. Ward H., 710 Five Mile Line Rd., Webster

Miller, J. E., Canandaigua. **Nurseryman**

Mitchell, Rudolph, 125 Riverside Drive, New York 24. **Mechanical engineer**

* Montgomery, Robert H., 1 E. 44th Street, New York

Mossman, Dr. James K., Black Oaks, Ramapo

Newell, Palmer F., Lake Road, Route No. 1, Westfield

O'Brien, Esmonde M., 25 South Street, P. O. Box 2169, New York 4

Owen, Charles H., Sennett. **Superintendent of Schools**

Pura, John J., Green Haven, Stormville

Salzer, George, 169 Garford Road, Rochester 9. **Milkman, chestnut tree grower**

Schlegel, Charles P. 990 South Ave., Rochester 7

Schlick, Frank, Munnsville

Schmidt, Carl W., 180 Linwood Avenue, Buffalo

Shannon, J. W., Box 90, Ithaca

Sheffield, Lewis J., c/o Mrs. Edna C. Jones, Townline Road, Orangeburg

Slate, Prof. George L., Experiment Station, Geneva. **Fruit Breeder**

Smith, Jay L., Chester. **Nut tree nurseryman**

Spahr, Dr. Mary B., 116 N. Geneva St., Ithaca

Steiger, Harwood, Red Hook. **Artist-designer**

** Szego, Alfred, 77-15A 37th Avenue, Jackson Heights, New York

Wadsworth, Millard E., Oswego

Wheeler, Robert C., 36 State Street, Albany

Windisch, Richard P., c/o W. E. Burnet Company, 11 Wall St., New York 5

* Wissman, Mrs. F. De R. (Retired)

NORTH CAROLINA

Brooks, J. R., Box 116, Enka

Dunstan, Dr. R. T., Greensboro College, Greensboro

Finch, Jack R., Route 1, Bailey. **Farmer**

Parks, C. H., Route No. 2, Asheville. **Mechanic**

NORTH DAKOTA

Bradley, Homer L., Long Lake Refuge, Moffit. **Refuge Manager**

OHIO

Ackerman, Lester Route No. 3, Ada

Glen Helen Department, Antioch College, Yellow Springs

Barden, C. A., 215 Morgan Street, Oberlin. **Real Estate**

Beede, D. V., Route No. 3, Lisbon

Bitler, W. A., R. F. D. 1, Shawnee Road, Lima. **General contractor**

Borchers, Perry E., 412 W. Hillcrest Ave., Dayton 6

Brewster, Lewis, Route No. 1, Swanton. **Vegetable grower**

Bridgwater, Boyd E., 68 Cherry St., Akron 8. **V. P. Bridgwater Machine Co.**

Bungart, A. A., Avon

Button, Fred, Route 2, McArthur

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Cinadr, Mrs. Katherine, 13514 Coath Ave., Cleveland 20. **Housewife**

Clark, Richard L., 1517 Westdale Rd., South Euclid 21. **Sales manager**

Cook, H. C., Route No. 1, Box 125, Leetonia

Cornett, Charles L., R. R. Perishable Inspection Agency, 27 W. Front St., Cincinnati. **Inspector**

Craig, George E., Dundas (Vinton County). **Fruit and nut grower**

Cranz, Eugene F., Mount Tom Farm, Ira

Cunningham, Harvey E., 420 Front Street, Marietta

Daley, Jame R., Route No. 3, Foster Park Road, Amherst. **Electrician**

Davidson, John, 234 East Second Street, Xenia. **Writer**

Davidson, Mrs. John, 234 East Second Street, Xenia

Diller, Dr. Oliver D., Dept. of Forestry, Ohio Exp. Sta., Wooster

Distelhorst, P. E., 3532 Douglas Road, Toledo 6

Dowell, Glenn C., Jr., M.D., 116 26th Street, N.E., Canton 4

Dowell, Dr. Lloyd L., 529 North Ave., N. E., Massillon. **Physician**

Farr, Mrs. Walter, Route No. 1, Kingsville

Fickes, Mrs. W. R., Route 1, Wooster

Garden Center of Greater Cleveland, East Blvd. at Euclid Ave., Cleveland

Gerber, E. P., Kidron

Gerstenmaier, John A., 13 Pond S. W., Massillon. **Letter carrier**

Goss, C. E., 922 Dover Avenue, Akron 20

Grad, Dr. Edward A., 1506 Chase Street, Cincinnati 23

Hake, Hanrey, Edon

Hansley, C. F., Box 614, Sugar Grove. **Contractor**

Hawk & Son Nursery, Route No. 2, Beach City. **Chestnut trees**

Hill, Dr. Albert A., 4187 Pearl Road, Cleveland

Hinde, John G., Route 1, Sandusky

Hornyak, Louis, Route No. 1, Wakeman

Howard, James R., 2908 Fleming Road, Middletown

Irish, Charles F., 418 E. 105th St., Cleveland 8. **Arborist**

Jacobs, Homer L., Davey Tree Expert Company, Kent

Kappel, Owen, Bolivar

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Laditka, Nicholas G., 5322 Stickney Ave., Cleveland 9. **Electrician**

Leaman, Paul Y., Route No. 1, Creston

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Oches, Norman M., R. D. 1, Brunswick. **Mechanical Engineer**

Osborn, Frank C., 4040 W. 160th St., Cleveland 11. **Tool and die maker**

Page, John H., Box 34, Dundas (Vinton County)

Pataky, Christ, Jr., 492 Hickory Lane, Route No. 4, Mansfield. **Produce market, grocer**

Pattison, Aletheia, 5 Dexter Place, E. W. H., Cincinnati 6

Pomerene, Walter H., Route No. 3, Coshocton. **Agricultural Engineer, Hydrological Research Station**

Purdy, Clyde W., 19 Public Square, Mt. Vernon

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Roberts, J. Pearl, Rt. 3, Freeport

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Spring Hill Nurseries Company, Tipp City. **General nurserymen**

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Thomas, Fred, 773 Bedford Road, Masury

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Von Gundy, Clifford R., R. F. D. No. 8, Cincinnati 30

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Weaver, Arthur W., R.F.D., Box 196B, Cass Rd., Maumee

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Yoder, Emmet, Smithville

OKLAHOMA

Butler, Roy, Route No. 2, Hydro. **Farmer, cattleman**

Cross, Prof. Frank B., Dept. of Horticulture, Oklahoma A&M College, Stillwater. **Teaching and Experiment Station Work**

Gray, Geoffrey A., 1628 Elm Ave., Bartlesville

Hartman, Peter E., 3002 S. Boston Pl., Tulsa 5. **Nurseryman**

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Kissick E. A., State Board of Agr., 122 State Capitol Bldg., Oklahoma City. **Marketing Specialist**

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OREGON

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Graville, Ed., Route 3, Box 363, Junction City

Miller, John E., Treasuredale, Route No. 1, Box 312-A, Oswego

Pearcy, Harry L., Route 2, Box 190, Salem. **H. L. Pearcy Nursery Co. (Nut trees.)**

Trunk, John E., General Manager, Northwest Nut Growers, Dundee

PENNSYLVANIA

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Allaman, R. P., Route 86, Harrisburg. **Farm superintendent**

Amsler, E. W., 707 Main St., Clarion

Anthony, Roy D., 215 Hillcrest Ave., State College. **Retired Professor of Horticulture**

Arensberg, Charles F. C., First Nat'l Bank Bldg., Pittsburgh 22. **(Chinese chestnut seed grower.)**

Banks, H. C., Route No. 1, Hellertown

Beard, H. K., Route No. 1, Sheridan. **Insurance agent**

Beck, Dr. William M., 200 Race St., Sunbury

Berst, Charles B., 11 W. 8th Street, Erie. **Inspector, Lord Mfg. Co., Erie, Pa.**

Blittle, George, 107 Lincoln Highway, Penndel

Bowen, John C., Route No. 1, Macungie

Brown, Morrison, Ickesburg

Buckwalter, Geoffrey R., c/o F. H. Levey Co., Inc., 1223 Washington Ave., Philadelphia 47.

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Colwell, Dr. Frederick A., R.F.D. No. 1, Collegeville

Comp, Alton, 5 North 2nd St., Newport

Damask, Henry, 1632 Doyle Street, Wilkinsburg 21 **Telephone man**

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Ebling, Aaron L., Route No. 2, Reading

Etter, Fayette, P. O. Box 57, Lemasters. **General foreman for an electric company**

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Gardner, Ralph D., 4428 Plymouth St., Colonial Park, Harrisburg. **Assistant State Fire Marshal**

Good, Orren S., 316 N Fairview Street, Lock Haven. **Retired**

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Hammond, Harold, 903 South Poplar Street, Allentown

Hershey, John W., Route No. 1, Downingtown. **Nurseryman**

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Jones, Mildred M. (See Mrs. Langdoc—under Illinois)

Jones, Dr. Truman W., Walnut Grove Farm, Parksburg

Kaufman, Mrs. M. M., Box 69, Clarion

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Knouse, Charles W., Colonial Park, Harrisburg. **Coal dealer**

Leach, Will, 406-410 Scranton Life Bldg., Scranton 3. **Lawyer**

Mattoon, H. Gleason, Box 304, Narberth. **Consultant in Arboriculture**

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Miller, Elwood B., Mill and Chapel Sts., Hazleton

Miller, Robert O., 3rd and Ridge Streets, Emmaus

Moyer, Philip S., 80-82 U. S. F. & G. Bldg., Harrisburg. **Attorney**

Neiderriter, Leonard, 1726 State St., Erie

Nonnemacher, H. M., Box 204, Alburts. **Line foreman, Bell Tel. Co. of Pa.**

Reidler, Paul G., Front and Chestnut Streets, Ashland. **Manufacturer of textiles**

* Rick, John, 438 Penna. Sq., Reading. **Fruit grower and merchant**

Schaible, Percy, Upper Black Eddy. **Laborer**

Schieferstein, William B., Box 457, Temple

Shade, Earl L., 1027 E. 26th St., Erie

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Smith, Dr. J. Russell, 550 Elm Ave., Swarthmore. **Retired teacher, writer**

Smyth, C. Wayne, 1 Prospect St., Troy. **Attorney**

Stewart, E. L., Pine Hill Farms Nursery, Route No. 2, Homer City

Theiss, Dr. Lewis E., 110 University Ave., Lewisburg. **Retired professor**

Thompson, Howard A., 311 West Swissvale Ave., Pittsburgh 18

Twist, Frank S., Box 127, Northumberland. **Salesman**

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Weinrich, Whitney, P. O. Box 225, Wallingford. **Chemical engineer**

* Wister, John C., Scott Foundation, Swarthmore College, Swarthmore. **Horticulturist**

Wright, Ross Pier, 235 W. 6th Street, Erie. **Manufacturer**

Zimmerman, Mrs. G. A., R. D., Linglestown

RHODE ISLAND

* Allen, Philip, 178 Dorance Street, Providence

SOUTH CAROLINA

Bregger, John T., Clemson. **Research Supervisor (Soil Conservation), Orchard Erosion Investigations**

Gordon, G. Henry, c/o Union Dry Cleaning Co., 1314 Main St., Union. **Returned Mariner**

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SOUTH DAKOTA

Hanson, Oliver G., Route 2, Box 194, Yankton

Richter, Herman, Madison. **Farmer**

TENNESSEE

Alpine Forest Reserve, Alpine. (c/o Dr. H. S. Randolph, 156 5th Ave., New York City)

Boyd, Harold B., M.D., 3418 Waynoka St. Memphis 11. **Physician**

Chase, Spencer B., T. V. A., Norris. **Horticulturist**

Collier, Robert H., Lutie Rd., Route 2, Knoxville

Dulin, Charles R., Brownsville. **Fruit grower**

Dye, Mrs. Sherman, Howell Nurseries, Sweetwater. **Chestnut and Ornamental Nursery**

Garrett, Dr. Sam Young, 1902 Hayes St., Nashville. **Surgeon**

Holdeman, J. E., 855 N. McNeil St., Memphis 7

Jones, D. T., Route 2, Midway

McDaniel, J. C. (See under Illinois)

Meeks, Hamp, c/o Jackson Elec. Dept., Jackson. **Electrical Engineer**

Murphy, H. O., 12 Sweetbriar Avenue, Chattanooga. **Fruit grower**

Richards, Dr. Aubrey, Whiteville. **Physician**

Roark, W. F., Malesus. **Farmer, chestnut grower**

Robinson, W. Jobe, Route No. 7, Jackson. **Farmer**

Saville, Chris, 118 Church St., Greeneville
Waterhouse, Carmack, P. O. Box 258, Oak Ridge

TEXAS

Arford, Charles A., Box 1230, Dalhart. **R. R. engineer, amateur horticulturist**
Brison, Prof. F. R., Dept. of Horticulture, A. & M. College, College Station
Florida, Kaufman, Box 154, Rotan
§ Kidd, Clark, Arp Nursery Co., P. O. Box 867, Tyler. **Nut nurseryman**
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Praytor, T. J., Box 667, Seymour
Reasonover, J. Ray, Route 2, Kemp
Winkler, Andrew, Route 1, Moody. **Farmer and pecan grower**

UTAH

Dabb, Clifford H., Route 3, Box 448, Ogden
Ericksen, Keith, 883 N. State Street, Orem
Petterson, Harlan D., 3910 Raymond Avenue. South Ogden. **Highway engineer**
Price, Harold G., Sr., 1270 E. Crystal Ave., Salt Lake City 6. **(Farm in Putnam County, Illinois)**

VERMONT

Aldrich, A. W., R.F.D. No. 2, Box 266, Springfield
Ellis, Zenas H., Fair Haven. Perpetual member, **"In Memoriam."**

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Cooper, Lawrence E., Belle Meade. **Nurseryman-landscaper**
Curthoys, George A., P. O. Box 34, Bristol
Dickerson, T. C., Jr., 316-56th Street, Newport News. **Statistician, farmer**
Gibbs, H. R. Linden. **Carpenter, wood worker**
Jenkins, Marvin, Brightwood. **Farmer**
Lee, Dr. Henry, 806 Medical Arts Building, Roanoke 11
Moore, R. C., Virginia Agricultural Experiment Station, Blacksburg 13
Narten, Perry F., 6110 N. Washington Blvd., Arlington 5
Pinner, Henry, P. O. Box 155, Suffolk
Stoke, H. F., 1436 Watts Avenue N.W., Roanoke
Stoke, Mrs. H. F., 1436 Watts Avenue, N.W., Roanoke
Thompson, B. H., Harrisonburg. **Manufacturer of nut crackers**

WASHINGTON

Eliot, Craig P., P. O. Box 158, Shelton. **Electrical engineer, part time farmer**
Erkman, John O., Apt. 85, 1219 Washington Way, Richland. **Physicist**
Fulmer, W. L., 505 Boylston, No., Seattle 2. **Lily grower**
Latterell, Miss Ethel, 408 N. Flora Rd., Greenacres. **Greenhouse worker**
Linkletter, Frank D., 115 4th Ave. North, Seattle 9. **Retired**
Naderman, G. W., Route 1, Box 353, Olympia. **Caretaker of summer resort**
Ross, Verel C., 4025 Rucker Ave., Everett
Shane Brothers, Vashon
Tuttle, H. Lynn, Lynn Tuttle Nursery, The Heights, Clarkston. **Nut nurseryman**

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WEST VIRGINIA

Eckerd, John K., 305 William Street, Martinsburg. **Engineer, steam**
Engle, Blaine W., Mutual Fire Ins. Co. of W. Va., Goft Bldg., Clarksburg
* Frye, Wilbert M., Pleasant Dale. **Retired**
Gold Chestnut Nursery, c/o Mr. Arthur A. Gold, Cowen. **Chestnut nurseryman**
Hale, Daniel, M.D., Princeton
Hartzell, Benjamin, Shepherdstown
Long, J. C., Box 491, Princeton. **Civil engineer**
McNeill, John Hanson, Box 531, Romney. **Chem. Engineer**
Mish, Arnold F., Inwood. **Associational farmer**
Reed, Arthur M., Moundsville. **Proprietor, Glenmount Nurseries**
Williams, Mrs. Dan, Romney

WISCONSIN

Eiler, William, Benton
Ladwig, C. F., 2221 St. Laurence, Route 2, Beloit. **Grocer and (hobby) farmer**
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Snowden, Dr. P. W., The Monroe Clinic, Monroe.

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 REPORT OF THE PROCEEDINGS AT THE FORTY-SECOND ANNUAL MEETING ***

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