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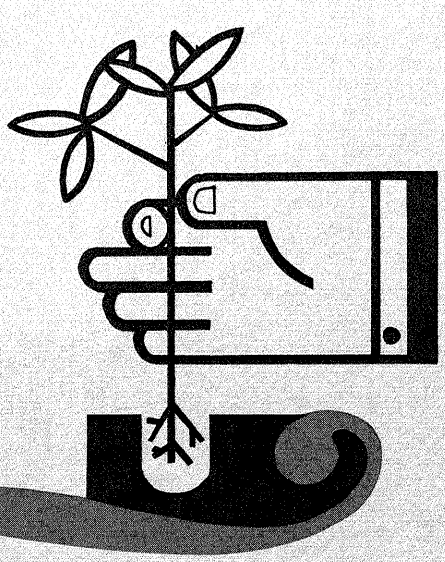

Bibliography of Walnut Supplement No. 2

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NORTH CENTRAL FOREST EXPERIMENT STATION
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FOREWORD

Dillow, Martha K.
1975. Bibliography of walnut--supplement No. 2. North Cent. For. Exp. Stn., St. Paul, Minn. 26 p. (USDA For. Serv. Gen. Tech. Rep. NC-13)

A supplement to Research Paper NC-9 published in 1966, and Research Paper NC-70 published in 1971, this list covers 223 additional references dealing with the growth and production of walnut.

OXFORD: 0(048.1):176.1(*Juglans nigra*).

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FOREWORD

Since publication of "An Annotated Bibliography of Walnut and Related Species," USDA Forest Service Research Paper NC-9, by David T. Funk in 1966, and "Annotated Bibliography of Walnut--Supplement No. 1," USDA Forest Service Research Paper NC-70, by Martha K. Dillow and Norman L. Hawker in 1971, we have accumulated an additional 223 literature references dealing with *Juglans* ecology, silviculture, and timber products. This supplement is an attempt to update the previous bibliographies by including citations that were unintentionally omitted in the original publications and those published since 1971.

The bibliography is arranged in alphabetical order by author. An index provides a list of items by subject matter. More than four-fifths of the items are annotated. Most of the remainder were either not seen by the author or were in a foreign language, with no English summary or translation available.

We would appreciate being notified of any errors in the list and also would be glad to know of any publications that were omitted and should be included in a future supplement.

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[1]*Numbers appearing in bold-face type refer to publications containing information on* J. nigra; *numbers appearing in italics refer to publications that do not contain any information on* J. nigra.

BIBLIOGRAPHY OF WALNUT--SUPPLEMENT NO. 2

Compiled by Martha K. Dillow

1. Anonymous. 1971. [SILVICULTURE OF BLACK WALNUT.] Bull. Soc. For. Franche-Comte 35(8): 232-233. [In French.]
Draws attention to the merits of Juglans nigra, *now out of fashion in France, and briefly gives advice on the establishment and treatment of plantations of this species.*

2. Ahmad, M., and M. N. Malik. 1971. A NOTE ON CHEMICAL EXTRACTIVES FROM WALNUT BARK (JUGLANS REGIA) AND THEIR EFFECTS ON CLEANSING OF TARTAR DEPOSITS. Pak. J. For. 21(3): 325-327.
The bark contained substantial mineral salts that probably have no direct effect as far as removal of unusual salty deposits on teeth is concerned. Various extractives produced remarkable masking effect on tartar that was also slightly dissoluble in extractives. The value of the bark as a local dentifrice lies in its antiseptic and antibacterial property in oral hygiene.

3. Ahmad, S., M. A. Wahid, and A. Q. S. Bukhari. 1973. FUNGISTATIC ACTION OF JUGLANS. Antimicrob. Agents Chemother. 3(3): 436-438.
A crude extract of the bark of Juglans regia *Linn tested against 13 species of fungi showed selective fungistatic action against some species of the dermatophytes tested.*

4. Allison, Franklin E., and Raymond M. Murphy. 1962. COMPARATIVE RATES OF DECOMPOSITION IN SOIL OF WOOD AND BARK PARTICLES OF SEVERAL HARDWOOD SPECIES. Soil Sci. Soc. Am. Proc. 26(5): 463-466.
The decomposition rates of the finely ground woods and barks of nine species of hardwoods were determined by measuring CO_2 release in the laboratory at two nitrogen levels. The following species were studied: black oak, white oak, red oak, post oak, hickory, red gum, yellow-poplar, chestnut, and black walnut. The variations in the rates of CO_2 release from the woods were not great, but hickory and black walnut barks decomposed much slower than the other barks. The hardwoods were attacked much more readily than most of the softwoods used in an earlier study; consequently, more nitrogen was required by the microorganisms that decomposed them.

5. Althen, F. W. von. 1971. EFFECTS OF WEED CONTROL ON THE SURVIVAL AND GROWTH OF PLANTED BLACK WALNUT, WHITE ASH, AND SUGAR MAPLE. For. Chron. 47(3): 223-226, illus.
Herbicide treatment using 3 to 9 lb/acre of active simazine is recommended for weed control in black walnut plantations. The most favorable cost-growth ratio was obtained with the 3 lb/acre simazine treatment. Mulching with black polyethylene is recommended for plantings where costs are less important than assured success.

6. Althen, F. W. von. 1971. EXTENDED STRATIFICATION ASSURES PROMPT WALNUT GERMINATION. For. Chron. 47(6): p. 349.
Cold storage in moist sand at 32° F for 19 mo improved germination rate of black walnut seed over that of seed stored for 7 or 31 mo. In 2 different years, southern Ontario seed stratified for 19 mo yielded 69 to 81 percent germination within 3 weeks after sowing.

7. Andreux, F., F. Jacquin, and M. Metche. 1970. [STUDY OF MINERALIZATION AND BIOLOGICAL HUMIFICATION OF FOLIAR AUTOLYSATES OF JUGLANS REGIA.] Acad. Sci. C. R. Ser. D. 270(25): 3017-3020. [In French.]
Not seen.

8. Andreux, F., M. Metcha, and F. Jacquin. 1971. [RELATIONSHIP BETWEEN ALPHA-HYDROJUGLONE AND ALLOMELANINS OF AUTOLYSATES OF JUGLANS REGIA LEAVES.] Acad. Sci. C. R. Ser. D 272(22): 2832-2835. [In French.]
Not seen.

9. Antoniuk, N. M. 1970. [ANATOMICAL-MORPHOLOGICAL FEATURES OF ORGANOGENESIS IN PERSIAN WALNUT (JUGLANS REGIA).] Bjul. Gl. Bot. Sada 77: 83-88. [In Russian.]
Gives details from studies on apical and lateral vegetative buds and flower buds of early- and late-fruiting cultivated forms in the Ukraine.

10. Ashley, Burl S., and John P. Slusher. 1973. INFORMATION AND SERVICES AVAILABLE TO THE LANDOWNER. In Black walnut as a crop, Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 111-113. North Cent. For. Exp. Stn., St. Paul, Minn.
The efficient production and marketing of walnut products is dependent upon aid available to the grower. Many sources and kinds of aid exist including on-the-ground technical assistance, publications, seminars, and incentive payments. By carefully analyzing his needs and soliciting assistance from the proper source, each grower can better prepare himself for a successful walnut enterprise.

11. Ayres, B. D. 1972. TREE RUSTLERS RIDE PLAINS. Plants Gard. 27(4): 53-54.
Not seen.

12. Badalov, P. P. 1971. [INTRODUCING JUGLANS NUT TREES INTO VESELOBOKOVEN' KOVSKAIA TREE BREEDING AND DENDROLOGICAL STATION.] Lesovod. Agrolesomelior. 25: 47-52. [In Russian.]
Not seen.

13. Baev, Kh., and N. Nedev. 1970. [A STUDY OF SEVERAL TRAITS AND PROPERTIES OF INTER-SPECIES HYBRIDS OF FREE POLLINATION IN GENUS JUGLANS.] Gen. Sel. 3(4): 287-299. [In Bulgarian.]
Not seen.

14. Baran, E. I. 1972. [THE USE OF SIMAZINE IN A WALNUT SEEDLING NURSERY.] Khim. Selsk. Khoz. 10(4): 55-56. [In Russian.]
*Simazine at 5 kg/ha, applied in the autumn 2 weeks after sowing, did not reduce the germination of walnuts (*Juglans regia?*) but increased the stem and root growth and the leaf area of the seedlings. Weed control was very satisfactory; the weight of surviving weeds was only one-half as much as those regrowing after repeated hand hoeing.*

15. Barnes, M. M., G. S. Sibbert, and C. S. Davis. 1971. WALNUT APHID MANAGEMENT: APHID EFFECTS ON WALNUT PRODUCTION AND QUALITY. Calif. Agric. 25(5): 12-13.
In a 2-yr trial with Payne walnuts to assess the beneficial effects of controlling aphids (insecticides not specified), aphid infestations of untreated control trees resulted in crop losses of 10 and 26 percent in the first and second year, respectively, and a 25 percent reduction in the number of large, sound nuts compared with treated trees. The numbers of offgrade nuts were also increased by 10 percent and diamond kernel nuts were reduced by 11.5 percent. The economic advantages resulting from aphid control are noted. Elsewhere, walnut aphids were effectively controlled by the wasp Trioxys pallidus.

16. Beineke, Walter F., and William J. Lowe. 1969. A SELECTION SYSTEM FOR SUPERIOR BLACK WALNUT TREES AND OTHER HARDWOODS. South. For. Tree Improv. Conf. Proc. 10: 27-33.
Unfortunately, the selection of superior black walnut trees in mixed, uneven-aged stands does not permit the use of comparison trees as in pure even-aged stands. A point system based on knowledge of variation within a species has been developed and applied to black walnut in Indiana. Trees are not compared to others within the stand but to those throughout the geographic area of selection.

17. Beineke, Walter F., and Charles J. Masters. 1973. BLACK WALNUT PROGENY AND CLONAL TESTS AT PURDUE UNIVERSITY. South. For. Tree Improv. Conf. Proc. 12: 233-242.
The genetic improvement of Indiana black walnut has progressed along two important fronts: (1) progeny testing of superior tree selections, and (2) clonal development and testing of these selections. Prior to clone-bank flowering, half-sib testing of superior individuals comprised the bulk of our work. Nursery, 1-, 2-, and 3-yr-old outplanting results have shown surprisingly high inheritance and genotypic and phenotypic correlations on growth parameters. In addition, family performance compared with the commercial check has been outstanding. At this time the clonal program utilizes 106 grafted clones. Analysis of variance and heritability estimates on foliation date, defoliation date, height, diameter, sweep, crook, branch angle, branch number, and anthracnose resistance show striking differences.

18. Belostokov, G. P. 1970. [MORPHOGENESIS OF ONE-YEAR SEEDLINGS OF JUGLANS MANDSHURICA.] Bjul. Gl. Bot. Sada 75: 85-88. [In Russian.]
Gives a detailed illustrated description of development from germination to the end of the first year.

19. Bergmann, L., W. Grosse, and H. G. Ruppel. 1970. [FORMATION OF SEROTONIN IN JUGLANS REGIA L.] Planta 94(1): 47-59. [In German with English summary.]
Serotonin was found in the walnut embryo and cotyledons but not elsewhere in the seed or mature plant. Serotonin formation appears not to be a special type of nitrogen storage but a way of ammonia detoxification in which ammonia from protein amino acid degradation is incorporated into serotonin via tryptophan.

20. Berry, Frederick H. 1973. DISEASES. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 88-90, illus. North Cent. For. Exp. Stn., St. Paul, Minn.
Several diseases that can cause considerable damage to black walnut trees are discussed. Walnut root rots are serious in a number of nurseries where black walnut are grown. Anthracnose is the most serious foliage disease of black walnut, and some methods for its control are suggested. Other diseases discussed include walnut bunch, heart rots, and cankers.

21. Bey, Calvin F. 1972. LEAF FLUSH IN BLACK WALNUT AT SEVERAL MIDWEST LOCATIONS. Northeast. For. Tree Improv. Conf. Proc. 19: 47-51.
Data on leaf flush in black walnut were collected in three provenance and two progeny tests at three widely separated locations. In all plantations, trees from southern sources flushed earlier than trees from northern sources. Trees from sources that flushed early one year also flushed early the next. In a progeny test on two sites, the trees from families that flushed early on the upland site also flushed early on the bottomland site.

22. Bey, Calvin F. 1972. TRENDS IN GROWTH OF BLACK WALNUT ORIGINATING IN VARIOUS GEOGRAPHIC AREAS. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 83-86, illus.
In an effort to obtain information useful in establishing walnut plantations, patterns of growth and phenological characters of trees originating in different geographic locations have been observed. No geographic area produced unusually large or small seed. Trees from the southern sources generally flushed earlier, dropped their leaves later, grew taller, and had more lateral buds on the current year's terminal than trees from northern sources.

23. Bey, Calvin F. 1973. CORRECTIVE PRUNING YOUNG BLACK WALNUT TREES--A NEW TWIST. North. Nut Grow. Assoc. Annu. Rep. 63(1972): 26-28, illus.
A "new twist" procedure for eliminating forks and multiple tops in young black walnut trees involves using weaker shoots as supports for straightening the most promising terminal. Judicious bending, taping, and clipping on young trees can increase the chances of producing high-quality boles.

24. Bey, Calvin F. 1973. GENETIC VARIATION AND SELECTION. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen Tech. Rep. NC-4, p. 62-65, illus. North Cent. For. Exp. Stn., St. Paul, Minn.
Research dealing with genetic variation and selection in black walnut has confirmed the idea of wide genetic diversity. Growth, form, leaf flush, leaf fall, and period of growth are genetically variable. Leaf flush usually begins 1 day earlier for every 85 mi south of the planting site that seed is collected. In field tests, leaf fall is delayed about 1 day for every 25 mi to the south that seed is collected. Trees from as far as 200 mi south of the planting site generally grow as large or larger in height and diameter than trees from local or northern sources.

25. Bey, Calvin F. 1973. GROWTH OF BLACK WALNUT TREES IN EIGHT MIDWESTERN STATES--A PROVENANCE TEST. USDA For. Serv. Res. Pap. NC-91, 7 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.
At age 6, survival of black walnut trees was not related to latitude of the source at six out of eight locations. Trees from as far as 200 mi south of the planting generally grew as large or larger than trees from local or northern sources.

26. Bey, Calvin F., Norman L. Hawker, and Paul L. Roth. 1972. VARIATIONS IN GROWTH AND FORM IN YOUNG PLANTATION BLACK WALNUT TREES. South. For. Tree Improv. Conf. Proc. 11: 120-127, illus.
Growth, form, and phenological characters were evaluated in young black walnut trees. Analysis of variance revealed that most characters showed source differences while only a few characters showed family within-source differences. Heritability estimates

indicate that the potential for genetic gain for growth, flushing, and leaf fall characters are good.

27. Bey, Calvin F., A. S. Mickelson, and M. Gerardo. 1972. BLACK WALNUT SEEDLING SEED ORCHARD DEVELOPMENT--A CASE HISTORY. Northeast. Area Nurserymen's Conf. Proc., p. 48-56, illus.
The major phases essential for developing a black walnut seedling seed orchard include: (1) defining the planting and seed collection areas, (2) collecting seed for the seed orchard trees, (3) selecting the orchard site, (4) establishing the orchard, (5) caring and maintaining the orchard, (6) selecting superior phenotypes and thinning the orchard, and (7) planning for the next-generation orchard.

28. Blyth, James E. 1973. TIMBER DEMAND AND USE. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 7-9. North. Cent. For. Exp. Stn., St. Paul, Minn.
The use of walnut increased from 1933 to the mid-1960's, then probably peaked-out between 1963 and 1968. The proportion of walnut logs used for veneer has been increasing during the last 2 decades while the proportion used for lumber has been declining. Most export logs are cut into veneer. The demand for walnut logs has varied considerably during the 1960's, but the general trend of log prices has been sharply upward. Rising prices with fluctuating demand indicate a scarcity of high-quality walnut, a need for more efficient and complete utilization of the walnut resource, and the necessity for reducing costs in domestic manufacturing of walnut products so they can remain competitive with substitutes and foreign products.

29. Bolar, Max D. 1973. ORCHARD ESTABLISHMENT IN ARKANSAS. In Black walnut as a crop, Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For Serv. Gen Tech. Rep. NC-4, p. 79-80. North Cent. For. Exp. Stn., St. Paul, Minn.
Although some black walnut orchards were started in earlier years, production planting for the multiple cropping of nuts, saw logs, and agricultural crops began in Arkansas Soil Conservation Districts in early 1972. Orchard sites were selected by use of the "Woodland Suitability Group" system as used by the Soil Conservation Service. Krajicek's formula was used as a basis for spacing orchards. The planting techniques described assured good survival the first year despite a drought.

30. Bonev, I. 1971. [PRODUCTION OF WALNUT GRAFTED SAPLINGS IN BULGARIAN POPULAR REPUBLIC.] Rev. For. Fr. 6: 609-614. [In French.]
Not seen.

31. Borovskiĭ, V. M. 1956. [SOILS OF THE WALNUT FORESTS OF SOUTHERN KAZAKHSTAN.] Tr. Inst. Pochvoved. Akad. Nauk Kaz. SSR 6: 32-43. [In Russian.]
The soils are thought to be young.

32. Botman, K. S. 1968. [NATURAL RESTORATION OF SOIL FERTILITY ON TERRACES OF MOUNTAIN SLOPES.] Pochvovedenie 4: 77-83. [In Russian with English summary.]
In the upper horizon of brown mountain-forest soil in the Tashkent region, total porosity, percent content of water-stable aggregates, and percent contents of N and water-soluable humus in the upper horizon were greater under 65-yr-old Persian walnut or English oak planted on terraces than those in the soil between the terraces. Oak litter should be removed from the terrace once in 5 yr, but walnut litter should be retained.

33. Boyette, Warren Giles. 1973. TREE CULTURE IN THE SOUTHEAST. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 55-58. North Cent. For. Exp. Stn., St. Paul, Minn.
Black walnut is scarce in hardwood stands of the southeast but good potential exists for growing more quality timber. Recent silvicultural knowledge coupled with research findings in other regions make the growing of black walnut practical. Problems, research results, and current recommendations are given for seed collection, nursery practices, site selection and preparation, plantings, and cultural practices. Silvicultural goals are stated and the problems needing further research are defined.

34. Brenneman, Dwight L. 1971. GROWING BLACK WALNUT IN NORTH CAROLINA. South. Lumberman 223(2776): 165-167.
Transplanting of seedlings is preferred over direct seeding, especially when large seedlings, at least 3/4-in. caliper, are

used. Planting on bedded sites and use of herbicides to control weeds are recommended.

35. Brunk, Eugene L. 1973. TREE IMPROVEMENT ACTION PROGRAMS--THE MISSOURI STORY. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 71-74, illus. North Cent. For. Exp. Stn., St. Paul, Minn.
Missouri's black walnut tree improvement action program is cooperative between the USDA Forest Service and the Forestry Division of the Department of Conservation. The program consists of a long-term single tree selection-progeny test-seed orchard (SPSO) development phase, and a short-term phase. The short-term phase includes super-sized seedling production, seed collection, and seedling distribution to specific geographic zones, concurrent provenance testing, and seed production area (SPA) development.

36. Burke, Robert D., and Robert D. Williams. 1973. ESTABLISHMENT AND EARLY CULTURE OF PLANTATIONS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 36-41, illus. North Cent. For. Exp. Stn., St. Paul, Minn.
Presents a summary of information needed to establish and care for black walnut plantations. Subjects discussed include: how to choose a planting site, spacing, seedling selection and care, when and how to plant seedlings or seed, benefits from interplanted species, the need for and how to control weeds, when and how to prune to promote apical dominance, and clear stem pruning.

37. Butkov, A. Ia., U. Allanazarova, and Iu. Mirzaev. 1972. [EFFECT OF MINERAL FERTILIZERS ON DEVELOPMENTAL PHASES OF JUGLANS REGIA AT BOSTANLYK STATION.] Uzb. Biol. Zh. 6: 51-55. [In Russian.]
Not seen

38. Butkov, E. A. 1972. [GROWTH IN THICKNESS OF TRUNKS OF JUGLANS REGIA GROWN WITHOUT IRRIGATION AND AFFECTED BY MINERAL FERTILIZERS.] Uzb. Biol. Zh. 5: 41-43. [In Russian.]
Not seen.

39. Byrnes, W. R., J. E. Krajicek, and J. R. Wichman. 1973. WEED CONTROL. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen Tech. Rep. NC-4, p. 42-48. North Cent. For. Exp. Stn., St. Paul, Minn.
Weeds are unwanted plants that seriously compete with young black walnut for essential growth factors--space, light, moisture, and nutrients. Weed control is very important in plantations to assure successful establishment and early growth of walnut. Mechanical methods are feasible for weed control, but chemical control with pre- or postemergence herbicides is normally more effective and economical. Herbicides can be applied broadcast over entire areas or restricted to strips or spots adjacent to planted trees. Users of herbicides should be familiar with herbicide regulations and stricly adhere to precautions and directions listed on the label.

40. Cavender, Clarence C. 1973. UTILIZATION AND MARKETING OF SHELLS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 77-78. North Cent. For. Exp. Stn., St. Paul, Minn.
For years the shells from black walnuts were considered a waste product; because 65 percent of the nut is shell, disposal was a costly and difficult problem. However, research and market potential have since shown that walnut shells can be used in a variety of ways. Today, black walnut shell is recognized as the best of all the nutshells and the demand has created as much of a shortage for black walnut shells as it has for the lumber and nut meats.

41. Cernilevskij, K. V. 1970. [INTRODUCTION OF JAPANESE SPECIES OF JUGLANS IN PODOLIA.] Bjul. Gl. Bot. Sada 77: 20-25. [In Russian.]
Gives data on the performance of J. sieboldiana *and* J. cordiformis *in several plantations, avenues, etc., of various ages (the oldest 63 yr) in this part of the West Ukraine. Both species are very frost-hardy, grow well, regenerate naturally, and produce valuable wood.* J. cordiformis *has fruit of particularly high quality and could be extensively grown in regions where* J. regia *suffers from frost. As regards wood production,* J. nigra *is superior to* J. sieboldiana *and* J. cordiformis.

42. Chaundhry, M. I., and N. K. Malik. 1972. OBSERVATIONS ON SOME IMPORTANT INSECT PESTS OF WALNUT. Pak. J. For. 22(3): 259-273, illus.
*Gives notes on 50 insect species that were found to damage various parts of walnut (*Juglans regia*).*

43. Chernoboi, G. M. 1971. [THE ROOT SYSTEM OF WALNUTS UNDER UNIRRIGATED CONDITIONS IN THE CRIMEAN STEPPE.] Tr. Gos. Nikitsk. Bot. Sada 52: 119-123. [In Russian with English summary.]
*Most walnut (*Juglans regia*?) roots spread horizontally in the 30- to 85-cm-deep soil layer and occupied an area 2.8 to 6.7 times larger than the crown. A planting distance of 15 to 18 m is recommended as the root system of walnuts reaches this diameter in 10- to 12-yr-old trees.*

44. Chumak, I. V. 1970. [THE RHYTHM OF GROWTH AND DORMANCY IN JUGLANS SPECIES INTRODUCED IN LENINGRAD.] Bot. Z. 55: 1181-1185. [In Russian.]
Periods of growth and dormancy were studied in three Juglans *spp. in relation to winter hardiness. Visible growth in the winter-hardy* J. mandshurica *and* J. cinerea *started earlier (end of April to beginning of May) than in the less-hardy* J. regia *(middle to end of May). Intensive growth in the hardier species was observed during the first part of the growing season and in the less-hardy species during the second half.*

45. Chumak, I. V., and I. N. Konovalov. 1971. [ACTIVITY OF RESPIRATORY ENZYMES IN INTRODUCED SPECIES OF JUGLANS.] In Introduktsiya i ekologiya drevesnykh rastenii v Moldavii, p. 22-36. [In Russian.]
Gives data on the activity of o-diphenol-oxidase and peroxidase in J. mandshurica, J. cinerea, *and* J. regia *growing in Leningrad. In all three species, o-diphenoloxidase activity increased towards the end of the growing season, decreased after lignification of the shoots, and fell to zero during the period of winter dormancy.*

46. Clark, F. Bryan. 1973. CULTURE: PAST, PRESENT, AND FUTURE. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 30-32. North Cent. For. Exp. Stn., St. Paul, Minn.
Black walnut culture began in the U.S. and Europe soon after colonization. Even so, commercial production of black walnut is still restricted primarily to the U.S. and Canada, but interest abroad continues. Present cultural practices are based on many years of experience and recent intensified research. Continuing research and additional experience are needed to improve practices. Research efforts are especially lacking in protection from insects and diseases and in economics.

47. Cook, O. F. 1923. EVOLUTION OF COMPOUND LEAVES IN WALNUTS AND HICKORIES. J. Hered. 14: 77-88.
Numerous leaf variants of walnut are described in terms of reversion to a primitive state.

48. Cooper, Glenn A. 1971. BLACK WALNUT EXTRACTIVES AVAILABILITY IS INFLUENCED BY THAWING-TO-EXTRACTION TIME. For. Prod. J. 21(10): 44-45.
The availability of black walnut heartwood extractives from green samples that have been frozen and thawed in the laboratory decreases as the time between thawing and extraction increases. Care must be exercised to account for this variable when making extractive determinations.

49. Cooper, Glenn A. 1972. PREFREEZING REDUCES SHRINKAGE AND ALTERS SORPTION IN BLACK WALNUT. For. Prod. J. 22(5): 54-60, illus.
Heartwood and sapwood of black walnut were prefrozen in the green condition at six temperatures from +14° to -320° F to test the effect of prefreezing on wood hygroscopicity, dimensional properties, and extractives. Prefreezing-to-drying time interval effects on board shrinkage were also measured. Induced shrinkage reductions and altered hygroscopicity were the combined effects of prefreezing on increased extractives bulking and altered rheology. The greatest effect was induced by prefreezing at -110° F; storage time intervals after prefreezing did not affect shrinkage reductions.

50. Cooper, Glenn A., Calvin F. Bey, Ronald D. Lindmark, and Richard C. Schlesinger. 1972. BETTER HARDWOODS--FROM SEEDS TO SAWLOGS AND MILLS TO MARKETS. South. Lumberman 225(2800): 111-114, illus.
Research at the Forestry Sciences Laboratory has resulted in increased black walnut growth, better stem characteristics, site selection criteria, greater seed supplies, better nursery management practices, utilization of woods residues, improved hardwood machining and drying techniques, new uses for hardwoods, and increased marketing and wood-use information.

51. Cooper, Glenn A., Eugene F. Landt, Ronald D. Lindmark, and Harold A. Stewart. 1973. CHANGING RESOURCE AND UTILIZATION. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug, 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 10-16, illus. North Cent. For. Exp. Stn., St. Paul, Minn.

Recent studies show that although the high-quality black walnut supply is diminishing, much untapped material is still available. The trees growing on nonforest land and logging residues can supply many of our needs. That low-quality material can be utilized has been demonstrated by woods residue recovery and conversion into products. Improved drying and machining techniques can increase efficiency of high-quality dimension part production, especially from low-quality raw material. Therefore, the manufacturer who practices close utilization can use the additional black walnut sources profitably.

52. Crandall, Bowen S., G. F. Gravatt, and Margaret Milburn Ryan. 1945. ROOT DISEASE OF CASTANEA SPECIES AND SOME CONIFEROUS AND BROADLEAF NURSERY STOCKS, CAUSED BY PHYTOPHTHORA CINNAMONI. Phytopathology 35: 162-180.
Isolates from root rot of seedling Juglans nigra *and* J. regia *killed 40 percent of 5-yr-old* J. nigra *trees. In nursery soil known to be infected with* P. cinnamoni, *poorly drained sites should be avoided.*

53. Crandall, Bowen S., and Carl Hartley. 1938. PHYTOPHTHORA CACTORUM ASSOCIATED WITH SEEDLING DISEASES IN FOREST NURSERIES. Phytopathology 28: 358-360.
In a North Carolina nursery, Juglans nigra *seedlings infected with* P. cactorum *wilted and died shortly after emergence; approximately 50 percent were lost before emergence. The infections apparently had started as soon as, or before, the nuts had germinated and continued as a root rot.*

54. Dahms, K.-G. 1971. [WALNUT WOOD--STILL IN DEMAND. I. WHERE DO WALNUT SPECIES COME FROM AND HOW DO THEY DIFFER? II. USES, PROCUREMENT AND SUBSTITUTES.] Holz-u. Kunststoffverarb. 6(4,8): 358-368; 568-575. [In German.]
I. Discusses the various species of Juglans, *their distribution, differences, etc., and tabulates the distinguishing features of the wood of* J. regia *and* J. nigra, *and some information on the heartwood color and main growth regions of 16 species or varieties of* Juglans. *II. Discusses uses as solid wood and veneer, and the sources of* Juglans *imports into West Germany. A table is given listing 34 timbers (from Asia, America, Australia, and, mainly, Africa) that could be used as substitutes for* Juglans.

55. Davey, A. J. 1935. NOTE ON THE STRUCTURE OF THE EPICOTYL IN JUGLANS NIGRA. New Phytol. 34: 201-210.
In the seedlings of certain species of Juglans *(notably* J. nigra*) the early plumular leaves possess a double leaf trace with isolated central protoxylem. The traces of the first leaves are directly connected with root poles but the traces of a number of the succeeding leaves have no such connection and their protoxylem does not penetrate into the root.*

56. Deneke, F. J., and R. W. Funsch. 1970. EARLY NOTES ON BLACK WALNUT PROVENANCE TESTS IN KANSAS. Kans. Acad. Sci. Trans. 72(3): 404-405.
After two growing seasons, survival for trees from southeastern sources was higher than that for local (Kansas) trees.

57. Dickson, Richard E. 1971. THE EFFECTS OF SOIL MOISTURE, TEXTURE, AND NUTRIENT LEVELS ON THE GROWTH OF BLACK WALNUT. USDA For. Serv. Res. Pap. NC-66, 6 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.
Black walnut seedlings grown in a clay loam and sandy soil were subjected to two soil moisture regimes and three fertility levels. Fertilization increased growth only under moist conditions. Under drought, fertilization retarded growth in the sand. Nitrogen was the element primarily responsible for the greater growth under moist conditions.

58. Duhan, K. 1970. [PRUNING AND CROWN FORMATION OF NUT TREES.] Besseres Obst 15: 107-109, illus.
The disadvantages of allowing natural crown development on walnut trees are discussed, and advice is given on suitable methods of crown training, the time of pruning, and wound treatment.

59. Dunmire, D. E., E. F. Landt, and R. E. Bodkin. 1972. LOGGING RESIDUE IS A SOURCE OF VALUABLE BLACK WALNUT DIMENSION. For. Prod. J. 22(1): 13-17, illus.
Bolts 2 to 6-1/2 ft long were produced from black walnut logging residue obtained from operations in southern Illinois. Over 800 graded bolts were bolter-sawed into 1-1/2-in.-thick flitches, dried, surfaced to 15/16-in. thickness, and then diagrammed for determining yields of usable dimension parts. Yields averaged about 75 percent of the bolt scale (International 1/4 Inch Rule) in usable clear one-side dimension. About 70 percent of the dimension volume was in cutting lengths of 24 to 78 in.

60. Elias, T. S. 1972. THE GENERA OF JUGLANDACEAE IN THE SOUTHWEST UNITED STATES. J. Arnold Arbor. 53(1): 26-51.
With sections containing descriptions and discussions of the family and the two genera Carya *and* Juglans, *each section having its own bibliography.*

61. Ellis, Gilbert R. 1972. PLASTIC MESH TUBES CONSTRICT BLACK WALNUT ROOT DEVELOPMENT AFTER TWO YEARS. Tree Plant. Notes 23(3): 27-28, illus.
Walnut seedlings grown in plastic mesh tubes had deformed roots after 2 yr due to the failure of the buried portion of the tube to break down. Even though early growth and survival of the seedlings are good, future development may be questioned because of the damaged root system.

62. Farmer, Robert E., Jr. 1973. VEGETATIVE PROPAGATION: PROBLEMS AND PROSPECTS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen Tech. Rep. NC-4, p. 66-70. North Cent. For. Exp. Stn., St. Paul, Minn.
Problems and opportunities in grafting, budding, and rooting black walnut are reviewed with emphasis on the role of these techniques in developing and using genetically improved stock. Better application of physiological principles should lead to increased production success with currently used grafting and budding procedures. Promising new information suggests that rooting will soon be a reliable technique. Some recommendations are made for future research and the development of propagation systems.

63. Farmer, Robert E., Jr., and G. C. Hall. 1973. ROOTING BLACK WALNUT AFTER PRETREATMENT OF SHOOTS WITH INDOLEBUTYRIC ACID. Plant Propagator 19(2): 13-14.
Etiolated shoots from juvenile Juglans nigra *seedlings rooted with 58 percent success (range 0 to 100 percent for 80 ortets) following pretreatment with 1 percent indolebutyric acid in lanolin. Rooting success was better in June than in April or May.*

64. Funk, David T. 1971. IDENTIFICATION AND PERFORMANCE OF JUGLANS HYBRIDS. Diss. Abstr. 32(12): 6761B-6762B.
The following traits of leaf morphology were selected for distinguishing Juglans nigra, J. regia, *and putative hybrids between the two species: leaflets per leaf, marginal serrations per centimeter, position of the longest leaflet pair on the leaf, leaflet length: width index, and leaf pubescence. A weighted hybrid index was calculated that separates the parent species and can be used to classify most putative hybrids.*

65. Funk, David T. 1973. GENETICS AND TREE IMPROVEMENT. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen Tech. Rep. NC-4, p. 59-61. North Cent. For. Exp. Stn., St. Paul, Minn.
Recent progress of walnut genetic research and action programs has been good. It is possible to make considerable genetic gains for growth traits simply by using walnut planting stock of appropriate geographic origin. The prospects for vegetative propagation are now considerably improved for rooting of cuttings as well as grafting.

66. Geis, James W. 1973. BIOGENIC SILICA IN SELECTED SPECIES OF DECIDUOUS ANGIOSPERMS. Soil Sci. 116(2): 113-132, illus.
Particulate opaline silica accounted for 0.01 to 3.79 percent of the dry weight of leaves from 36 deciduous angiosperm tree and shrub species that included Juglans nigra *and* J. cinerea.

67. Geyer, W. A., and G. G. Naughton. 1971. GROWTH AND MANAGEMENT OF BLACK WALNUT (JUGLANS NIGRA L.) ON STRIP-MINED LANDS IN SOUTHEASTERN KANSAS. Kans. Acad. Sci. Trans. 73(4): 491-501, illus.
Black walnut plantations on partially leveled strip-mined lands have been successfully established from seed. Dominant and codominant trees, after 32 yr, are 6.1 in. d.b.h. and 33 ft; site index, 40 to 45 ft. After the 28th yr, low thinning and single-tree release more than tripled d.b.h. growth compared to unreleased trees.

68. Gott, Donald H. 1973. FEDERAL TRADE COMMISSION GUIDES AND THEIR EFFECTS ON THE CONSUMER. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 23-25. North Cent. For. Exp. Stn., St. Paul, Minn.
Walnut and fine hardwoods consumer products now protected by Federal Trade Commission Guides are described. The Guides are interpreted, and the enforcement policies are explained; the consumer products still urgently in need of similar regulations are mentioned. Association activities in furniture case goods surveys and tag and label promotions are also described.

69. Graves, Arthur H. 1923. THE MELANCONIS DISEASE OF THE BUTTERNUT. Phytopathology 13: 411-435, illus.
The fungus is a weak parasite, entering twigs through previous wounds. In trees that are previously weakened, the fungus makes rapid progress; otherwise the disease advances slowly. The Japanese walnut is also particularly susceptible.

70. Grey, Gene W. 1973. SEVEN YEARS OF GROWTH. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen.Tech. Rep. NC-4, p. 4-6. North Cent. For. Exp. Stn., St. Paul, Minn.
The 7 yr since the Black Walnut Workshop have shown a continued decline in walnut log quality. The application of new research, tree improvement programs, and intensive culture give hope, however, that this downward curve may soon flatten. The walnut industry must also address itself to problems of marketing, economics, seedling production, and even social areas.

71. Grey, Gene W., and Gary G. Naughton. 1971. ECOLOGICAL OBSERVATIONS ON THE ABUNDANCE OF BLACK WALNUT IN KANSAS. J. For. 69(10): 741-743, illus.
Observations along the prairie-forest transition zone show that the high ratio of woodland edge to woodland area creates conditions of early forest succession that are highly favorable to black walnut and other early stage intolerant tree species.

72. Grosse, W., and H. Witzache. 1973. [IDENTIFICATION AND LOCALISATION OF TRYPTOPHAN SYNTHETASE IN SEEDS OF JUGLANS REGIA L.] Planta 111(1): 65-71. [In German.]
Not seen.

73. Gupta, S. R., B. Ravindranath, and T. R. Seshadri. 1972. POLYPHENOLS OF JUGLANS NIGRA. Phytochemistry 11(8): 2634-2636.
Apart from juglone, the bark of J. nigra *contains α-hydrojuglone-4-glucoside, myricetin, myricitrin, sakuranetin, sakuranin, and neosakuranin. These compounds appear to be absent in the sapwood and heartwood.*

74. Gutenev, V. I. 1970. [GRAFTING WALNUTS.] Sadovodstvo 10: 27-28. [In Russian.]
Scions 30 cm long with two vegetative buds were taken from the lower part of mature 1-yr-old shoots of young Juglans regia *trees and crown grafted in April on the walnut seedlings 4 to 6 m tall. The scions were taken in either October or March but only the latter grew satisfactorily. Of five grafting methods tried, only modified rind grafts gave a high (83 percent) proportion of takes.*

75. Hall, H. M. 1918. WALNUT POLLEN AS A CAUSE OF HAY FEVER. Science 37: 516-517.
Juglans hindsii *in California.*

76. Hammons, R. Dwain. 1973. UTILIZATION AND MARKETING OF NUTS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 75-76. North Cent. For. Exp. Stn., St. Paul, Minn.
About 60 percent of commercially processed black walnut kernels are repacked for retail sale to housewives, another 30 percent is used in ice cream, 5 percent in commercial baking, and 5 percent in candy manufacture. Sterilization of nutmeats is important in ice cream manufacture. No government standards have ever been established for nutmeat sizes or quality, except for bacterial control. Recently, smaller-sized nutmeats including meal have been used for retail distribution and ice cream. The annual supply of salable kernels has been reduced 40 percent in the last decade by cutting of good nut-producing trees for lumber, by disease, and by indiscriminate herbicide spraying.

77. Hansche, P. E., V. Beres, and H. I. Forde. 1972. ESTIMATES OF QUANTITATIVE GENETIC PROPERTIES OF WALNUT AND THEIR IMPLICATIONS FOR CULTIVAR IMPROVEMENT. Am. Soc. Hortic. Sci. J. 97(2): 279-285.
Heritabilities and phenotypic correlations among 18 trials of English walnut were estimated from measurements obtained over 14 yr from 38 parent and over 2,000 progeny trees. Heritabilities are above 80 for leafing date, first shedding of pollen, receptive date of pistils, harvest date, shell thickness, all nut and kernel measurements, and weight. All measures of nut and kernel size are highly correlated; they negate the practical value of measuring more than one of these traits. Selection of these traits correlated with yield appears to be an effective and economical means of achieving a reasonable rate of genetic gain in yield. Probably the key trait in this regard is fruitfulness of laterals.

78. Harlow, W. M. 1930. THE FORMATION OF CHAMBERED PITH IN THE TWIGS OF BUTTERNUT AND BLACK WALNUT. J. For. 28: 739-741.
Chambering does not take place until after extension growth of the twig has ceased, or nearly so.

79. Harris, R. W. 1971. THE CONTROL OF TRUNK SPROUTS ON LANDSCAPE TREES. Int. Shade Tree Conf. Proc. 46: 57a-63a.
In spraying trials, both NAA and 2,4,5-T effectively reduced the percent of new epicormics on all the trees treated, whether they were dormant or had begun new growth. Picloram was effective on the four species tested, especially Juglans nigra, *but when applied at 0.5 and 1 percent it killed 3-yr-old poplars and caused malformation and chlorosis in willows. NAA had no adverse effects, but 2,4,5-T caused some epinasty of the leaves in willows and poplars. With all compounds used, spraying dormant trees was less effective in reducing the growth of epicormics in* J. nigra, *olive, poplar, and willow than in* Eucalyptus, Pyrus kawakamii, Sequoia sempervirens, *and* Lagerstroemia indica. *Responses to different concentrations varied with species. There was little translocation of any compound, even at the high rates used. For general use, 0.5 to 1 percent NAA, applied to runoff, is recommended.*

80. Harris, R. W., R. M. Sachs, and R. E. Fissell. 1971. CONTROL OF TRUNK SPROUTS WITH GROWTH REGULATORS. Calif. Agric. 25 (11): 11-13, illus.
Regrowth of trunk sprouts on eight of nine species (including Juglans hindsii*) treated with growth regulators was reduced by 85 percent, as compared with untreated trees in these tests. The sprouts that did grow on treated trunks were only one-tenth to one-third as long as sprouts from untreated trunks. There was very little translocation of the growth regulators from the regions of application.*

81. Hiller, C. H., F. Freese, and D. M. Smith. 1972. RELATIONSHIPS IN BLACK WALNUT HEARTWOOD BETWEEN COLOR AND OTHER PHYSICAL AND ANATOMICAL CHARACTERISTICS. Wood & Fiber 4(1): 38-42.
Relationships in black walnut heartwood between color and specific gravity, extractive content, and anatomical characteristics were explored. Percent luminance, color brightness, was significantly related to extractive content and to the combination of extractive content and some of the measures of wood density. It was found that trees from Indiana compared with those from Missouri differed significantly in the following wood characteristics: lower extractive content, higher proportion of fibrous tissue with thinner cell walls, and smaller vessel lumens.

82. Holt, Harvey A., and Jack E. Voeller. 1972. EFFECT OF VEGETATION CONTROL ON ESTABLISHED BLACK WALNUTS. Arkansas Farm Res. 21(1): 8.
Chemical herbicides were applied to an 8- by 8-ft area around 13-yr-old 'Thomas' black walnut trees. Branch growth and nut quantity, weight, and size were all increased by chemical weed control.

83. Holt, Harvey A., and Jack E. Voeller. 1973. VEGETATION MANAGEMENT INCREASES PRODUCTION IN NUT ORCHARD. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 81-83. North Cent. For. Exp. Stn., St. Paul, Minn.
Tree growth, nut production, nut weight, and nut size were substantially increased by controlling vegetation with herbicides. The response to varying degrees of vegetation control has been consistent for the first 2 yr of the study. Because of the magnitude of response, controlling vegetation appears to be a cost of orchard management that will prove profitable over the long run.

84. Hryshko-Bohmenko, B. K. 1970. [ON PHENOMENON OF DICHOGAMY IN JUGLANS L.] Akad. Nauk. Ursr. Introd. Aklim. Rosl. Ukr. 4: 158-165. [In Ukranian.]
Not seen.

85. Járó, Z., and S. Horváth. 1960. [THE CALCIUM CONTENT OF FOREST LITTER AND ITS IMPORTANCE.] Erdész. Kut. 56: 93-103. [In Hungarian.]
CaO percent in leaves was lowest in early spring and highest at leaf fall. Highest contents occurred in Juglans nigra, Robinia pseudoacacia, *and* Populus tremula, *and the lowest in* Quercus *sp. and* Fagus silvatica. *For mixed stands on acid soils, the highest amounts of easily decomposable litter of high Ca contents are provided by* Tilia *sp.,* Acer campestre, *and* Carpinus betulus.

86. Jones, H. C., III, and J. W. Curlin. 1968. THE ROLE OF FERTILIZERS IN IMPROVING THE HARDWOODS OF THE TENNESSEE VALLEY. In Forest Fertilization: Theory and Practice, For. Fert. Symp. 1967, Tenn. Val. Auth., Knoxville, Tenn., p. 185-190.
Discusses results from fertilizing several hardwood species in the Tennessee Valley, and describes plans for a fertilization study with 17 families of black walnut as part of a tree improvement program.

87. Jovanović, B., and V. Valcić. 1970. [PHYTOCENOSIS OF WALNUT (JUGLANS REGIA L.) IN DJERDAP REGION.] Inst. Sumar. Drvnu. Ind. Zb. 9: 201-213. [In Croatian.]
Not seen.

88. Kaeiser, Margaret, and David T. Funk. 1972. STRUCTURAL CHANGES IN WALNUT GRAFTS. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 90-94, illus.
Twenty-two scion-rootstock combinations of Juglans *species and hybrids have been grafted, and all appear to be at least partially compatible.* J. sieboldiana *seems to be more compatible with other walnuts when used as a rootstock than when used as a scion. In 5-yr-old grafts of* J. regia *x* nigra *on* J. nigra, *the bark tends to grow faster on the stock than on the scion.*

89. Kahn, M. S. 1969. FUNGAL ASSOCIATES OF JUGLANS NIGRA L. Diss. Abstr. 29B(12, Part 1), (4471).
In greenhouse studies, walnut seedlings were grown in clay pots, in a rhizosphere inoculated with Fusarium *sp.,* Cylindrocarpon radicis, Rhizoctonia *sp., and two unidentified fungi (all originally isolated from walnut roots), individually and in all combinations, to determine whether the fungi are beneficial, neutral, or pathogenic parasites of the host; three nutrient levels were also studied. After 16 weeks, plants were harvested, root samples were examined microscopically, and the dry weight and the percent and weight of N and P of whole plants were determined; the color and growth of the seedlings were also assessed. Results suggest that the reactions of host and fungus differ when only one fungus is present from those when two or more are present.*

90. Khattak, G. M. 1969. EARLY RESPONSE OF PLANTED BLACK WALNUT TO SITE MODIFICATION. Diss. Abstr. 30B, 1, (12).
The treatments comprised: wind protection with snow fences, mulching with fresh hardwood chips, application of fertilizer, and irrigation (weekly surface application of 7.5 l/tree unless 2.5 cm of natural precipitation had fallen during the previous week). The effects of the treatments on soil moisture, amounts of K in the soil, and of K and N in leaves, leaf area, leaf water tension, and height and diameter growth in the first 2 yr are discussed. Direct planting of container-grown black walnut is recommended for farm forestry.

91. Khrichenko, E. M. 1971. [THE CHARACTERISTICS OF WALNUT TREE GROWTH ON THE SLOPES OF THE CENTRAL CAUCASUS FOOTHILLS.] Tr. Sev. Lesn. Opytn. Stn. 9: 111-122. [In Russian.]
*Walnut trees (*Juglans regia*?) planted on gentle and steep (terraced) slopes facing north and south were studied in the 7th year after planting. The trees grew well on several soil types and in monoculture, but not in mixed plantings. Tree height on the southern slopes was 1.3 to 1.5 times less than on the northern slopes, and trees on the outer part of the terraces grew better than those on the inner part.*

92. King, Alan. 1973. FORAGE AND TREES. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen.Tech. Rep. NC-4, p. 86-87. North Cent. For. Exp. Stn., St. Paul, Minn.
The use of walnut trees in a concept known as multiple cropping more fully utilizes the productivity of the land. Growing forage in the interim required for trees to mature seems to offer a logical use of medium- to high-cost cropland while sustaining trees as a secondary crop. The trees will gradually change from the secondary crop to the primary crop as they grow in size.

93. Krajicek, John E. 1972. SPACING AND PRUNING BLACK WALNUT TO PRODUCE BOTH NUTS AND LUMBER. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 95-98, illus.
Many landowners are interested in growing black walnut only for its nut production. Through careful control of spacing, prudent thinning, corrective pruning, and frequent but conservative clear-length pruning of the walnut trees, the nut grower should also be able to produce high-value sawlogs. Proper spacing and methods of pruning are discussed.

94. Krajicek, John E., and Robert D. Williams. 1971. CONTINUING WEED CONTROL BENEFITS YOUNG PLANTED BLACK WALNUT. USDA For. Serv. Res. Note NC-122, 3 p. North Cent. For. Exp. Stn., St. Paul, Minn.
Cultivation, atrazine, and simazine were used for weed control 1, 2, and 3 yr following planting of black walnut in Iowa and Indiana. In Iowa, 2 or more years of weed control resulted in the best seedling growth, but in Indiana 3 yr proved best. Method of weed control had no significant effect on seedling growth in Iowa, but chemical control resulted in better growth than cultivation in Indiana. After 5 yr in the Iowa planting, the walnut seedlings that had received weed control for 2 or 3 yr continued growing faster than those that had received only

1 yr of weed control, even though no weed control was done in at least the last 2 yr.

95. Krapf, B. 1971. [FLOWERING BIOLOGY AND FRUIT SETTING IN WALNUT TREES....] Schweiz. Z, Obst-u. Weinbau 107(11): 341-347, illus. [In German.]
A discussion of walnut seed production as influenced by dichogamy, apomixis, vegetative growth, and other factors.

96. Kribs, David A. 1927. COMPARATIVE ANATOMY OF THE WOODS OF JUGLANDACEAE. Trop. Woods 12: 16-21.
The results of this investigation indicate that the members of Juglandaceae comprise a "natural" family. They also indicate that there are only four distinct genera: Carya, Platycarya, Juglans, *and* Engelhardtia. Pterocarya *belongs with the division of* Juglans *of which* J. cinerea *may be considered the type, and* Alfaroa *belongs with the* Oreomunnea *section of* Engelhardtia.

97. Kung, Fan H. 1973. DEVELOPMENT AND USE OF JUVENILE-MATURE CORRELATION IN BLACK WALNUT TREE IMPROVEMENT PROGRAM. South. For. Tree Improv. Conf. Proc. 12: 243-249.
Cross section discs were cut at predetermined intervals from 19 black walnut trees. Growth rings on each disc were measured. Diameter, height, and volume at various ages were determined by stem analysis. Character used for early selection should have high juvenile-mature correlations. The earliest age for selection should maximize the product of the juvenile-mature correlation and the selection differential at that age.

98. Lagerstedt, H. B. 1972. A REVIEW OF WALNUT POLLINATION PROBLEMS AND THEIR SOLUTION IN OREGON. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 30-33.
Seasonal climatic variation, local site conditions, and tree age all interact to affect the year-to-year suitability of prospective pollenizers to be used in walnut orchards.

99. Landt, Eugene F., and Robert E. Phares. 1973. BLACK WALNUT...AN AMERICAN WOOD. USDA For. Serv. Am. Woods Leafl. FS-270, 7 p., illus.
Black walnut, one of America's most valuable tree species, has been prized since colonial times for furniture, interior finish, and gunstocks. Its nuts have a distinctive flavor that is relished by many. The decay-resistant heartwood is chocolate brown and occasionally has darker, sometimes purplish, streaks. The sapwood is almost white. It is straight-grained, strong, hard, heavy, stiff, easily worked with tools, and stays in place well after seasoning. Because of heavy use and wasteful cutting over the years, choice black walnut trees have become scarce and the price of logs has skyrocketed.

100. Lange, A. H., and J. C. Crane. 1967. THE PHYTOTOXICITY OF SEVERAL HERBICIDES TO DECIDUOUS FRUIT TREE SEEDLINGS. Am. Soc. Hortic. Sci. Proc. 90: 47-55, illus.
Fifteen herbicides were applied to the roots of six deciduous fruit tree species growing in nutrient-fed sand. Of the preemergence herbicides evaluated in this greenhouse test, simazine, diuron, and prometryne appeared to be safest on 'Northern California' black walnuts. Based on the results obtained, the postemergence herbicides dalapon, amitrole, and paraquat have promise for use in orchard crops. Walnuts were severely stunted at the 50 p/m amitrole rate, with pronounced chlorosis in young leaves. Dicamba and picloram are expected to prove too hazardous for orchard use.

101. Langrová, V., and Z. Sladký. 1971. THE ROLE OF GROWTH REGULATORS IN THE DIFFERENTIATION OF WALNUT BUDS (JUGLANS REGIA L.). Biol. Plant. 13(5,6): 361-367.
The character of endogenous regulators in walnut buds was followed by means of bioassays in the course of vegetation. It was ascertained that a rise in the level of gibberellin-like substances precedes the sprouting of buds. The origination of new buds in the axil of young leaves is accompanied by a fall in the level of auxins, a low gibberellin content, and the presence of inhibitors. In this situation the primordia of staminate catkins are differentiated in the basal buds. The vegetative buds, which are formed in the axils of further leaves, stop developing because of the accumulating inhibitors. Toward the close of vegetation the primordia of pistillate flowers originate in terminal buds and their differentiation is accompanied by a substantial rise in the level of auxin-like substances, while some of the inhibitors keep asserting themselves. On the basis of these findings, we have tested the possibility of affecting the differentiation of staminate primordia and of vegetative buds by the exogenous application of selected regulators. Spraying young leaves with IAA and MH solutions

will increase the number of vegetative buds in the twigs. A later spray of other twigs by TIBA and GA_3 solutions will increase the number of staminate buds.

102. Lebedinova, N. S. 1961. [MOISTURE REGIME OF DARK-BROWN FOREST SOILS OF WALNUT FORESTS.] Pochvovedenie 5: 21-33. [In Russian with English summary.]
In the walnut forests of southern Kirgizia, soil-moisture reserves increased in autumn through spring and decreased gradually in summer. The maximal and minimal moisture reserves under forest were greater than in the old cultivated soils that interrupt the continuity of the forest.

103. Lebedinova, N. S. 1968. [MOISTURE REGIME OF DARK BROWN SOILS UNDER A CANOPY OF DIFFERENT TYPES OF WALNUT FORESTS IN FERGAN.] Pochvovedenie 12: 32-41. [In Russian with English summary.]
In the walnut forests of south Kirgizia, evaporation exceeds precipitation and in the dry, second half of the vegetative period the trees depend entirely on soil-moisture reserves. This dependence is particularly great for Persian walnut because of its long vegetative period. In this mountainous region, Persian walnut receiving only natural moisture grows best where soil moisture derived from precipitation is supplemented by perched water tables or artesian water. Where soil-moisture reserves are insufficient, irrigation is necessary for good growth.

104. Lindsey, Steven E. 1973. COST AND INCOME TREATMENT ON SMALL WOODLANDS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 101-105. North Cent. For. Exp. Stn., St. Paul, Minn.
Universal demand and high value commonly associated with the sale of walnut timber may result in an excessive tax burden to farmers/woodland owners. It is the purpose of this report to present the proper treatment of incurred costs and the use, benefits, and regulations of long-term capital gains and losses as related to the small, individual timber owner.

105. Losche, Craig K. 1972. VERTICAL TILLAGE FAILS TO IMPROVE BLACK WALNUT SEEDLING GROWTH ON POORLY DRAINED SITE. Tree Plant. Notes 23(1): 7-9.
A soil modification method tested in southern Illinois to determine whether internal drainage of floodplain soils could be improved to promote better black walnut seedling growth provides no practical evidence of growth acceleration after four seasons.

106. Losche, Craig K. 1973. BLACK WALNUT GROWTH BETTER ON DEEP, WELL-DRAINED BOTTOMLAND SOILS. USDA For. Serv. Res. Pap. NC-154, 3 p. North Cent. For. Exp. Stn., St. Paul, Minn.
Site requirements of 25-yr-old plantation-grown black walnut on floodplains in southern Illinois were studied. Depth to a gravel layer was the only soil factor that significantly influenced height growth. There was a relationship between internal soil drainage and height growth.

107. Losche, Craig K. 1973. SELECTING THE BEST AVAILABLE SOILS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 33-35. North Cent. For. Exp. Stn., St. Paul, Minn.
The relationship between observable soil characteristics and black walnut growth is discussed, and a procedure is presented for using soil and topographic factors to select and evaluate areas for growing black walnut. Also, the influence of soil characteristics on the need for and extent of various cultural practices is examined.

108. Losche, C. K., W. M. Clark, E. E. Voss, and B. S. Ashley. 1972. GUIDE TO THE SELECTION OF SOIL SUITABLE FOR GROWING BLACK WALNUT IN ILLINOIS. Northeast. Area State and Priv. For. Spec. Pub., 38 p.
The soil series occurring in Illinois are classified as to their suitability for growing black walnut. Three categories--suitable, questionable suitability, and unsuitable--are used to assist Illinois Division of Forestry district foresters in selecting the better sites available for this valuable hardwood.

109. Losche, Craig K., and Robert E. Phares. 1972. SILTATION DAMAGE IN A BLACK WALNUT PLANTATION. J. Soil and Water Conserv. 27(5): 228-229, illus.
After unusually heavy rainstorms in the spring and fall of 1970, over 2,600 tons of silt were deposited over 2.8 acres in a black walnut plantation in north-central Missouri. This silt deposit caused extensive mortality and growth reduction in the

plantation. Walnut mortality and diameter-growth reduction were closely related to thickness of the silt deposit. Deposition of silt in the spring was more detrimental to walnut growth than siltation in the fall just preceding the winter dormant season. This episode demonstrates the need for erosion-control practices and for more critical site evaluation when selecting a planting area for this valuable hardwood species.

110. Loucks, William L., and Ray A. Keen. 1973. SUBMERSION TOLERANCE OF SELECTED SEEDLING TREES. J. For. 71(8): 496-497.
Ten deciduous species of tree seedlings were completely submerged during June and July. Two weeks' submergence caused little damage, but black walnut was intolerant of 4 weeks under water, being the only species to suffer complete mortality.

111. Lowe, W. J., W. F. Beineke, and E. J. Lott. 1973. PROPAGATION TECHNIQUES FOR BLACK WALNUT. Purdue Univ. Coop. Ext. Serv. Notes on For. and Wood-Use F-64, 6 p., illus.
Describes techniques suitable for grafting black walnut before and after growth of the rootstock has started.

112. McKay, J. W. 1972. WALNUT HYBRIDS AT BELTSVILLE, MARYLAND. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 34-38, illus.
F_1 hybrids between Juglans regia *and* J. nigra *tend to be sterile and produce very few nuts. F_2 hybrids tend to grow vigorously and are slow to bear. Although no seedling worthy of propagation as a nut variety has been found among 125 F_2 hybrids that have fruited, there appears to be sufficient variability to justify fruiting the remaining 275 seedlings.*

113. McMillan-Browse, P. D. A. 1971. PROPAGATION OF WALNUTS AND WING NUTS. Gard. Chron. 170(12): 20-21, 23.
Raising from seed and propagation by budding and grafting for Juglans *spp. is described with particular reference to work at East Malling Research Station.*

114. Maliga, P., and J. Tamási. 1957. [ROOT FORMATION OF THE WALNUT TREE IN SANDY SOIL.] Acad. Hortic. Bp. Ann. 21(4): 16. [In Hungarian with Russian and English summaries.]
Over 87 percent of the roots were located in the 40 to 220 cm layer of soil (60 percent at 40 to 60 cm) and about 12 percent at a depth of 20 to 40 cm.

115. Manušev, B. 1970. [STUDIES ON SOME METHODS OF GRAFTING WALNUTS IN THE REGION OF FAČE.] Jugosl. Vocarstvo 4(13): 51-59, illus. [French summary.]
Splice grafting green components in late May or early June was unsatisfactory, averaging over 3 yr only 15.6 percent take. Patch budding in June or July had 47.5 percent success, but patch budding with dormant buds in August showed less than 20 percent take.

116. Martin, G. C., H. A. Abdel-Gawad, and R. J. Weaver. 1972. THE MOVEMENT AND FATE OF (2-CHLOROETHYL) PHOSPHONIC ACID IN WALNUTS. Am. Soc. Hortic. Sci. J. 97(1): 51-54, illus.
^{14}C-Ethephon applied to a walnut leaflet penetrated and was translocated rapidly in young plants, but more slowly in older plants. The compound was translocated to the kernel at higher levels when applied to a leaflet than when applied to the hull, but in both cases the levels of activity were low. Between 5 and 7 days after application the radioactivity in the kernel decreased markedly. ^{14}C-Ethephon in the leaves, hull, shell, and kernel was metabolized, but no side products remained in the plant tissue that could be detected by the techniques employed.

117. Massengale, Robert. 1973. THE SIGNIFICANCE OF LOG AND TREE GRADING SYSTEMS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 28-29. North Cent. For. Exp. Stn., St. Paul, Minn.
Everyone who owns or plans on owning a walnut tree is interested in the value of that tree. Value is generally measured by tree or log grades. The number, type, and location of defects are common to all grading systems. Defects generally fall into two categories: (1) those that are natural or caused by some external force upon the tree, and (2) those that are created by man in his manufacturing or processing of the tree. Understanding defects and their importance to the manufacturing of the final product will help the timber landowner better understand the value of his resource and will guide him toward using the proper forest management practices.

118. Maurer, K. J. 1971. [SUN SCORCH DAMAGE IN WALNUTS AFTER THINNING OUT OLD CROWNS.] Erwerbsobstbau 13: 13-14, illus. [In German.]
Illustrations show bark damage by sun scorch and the occasional invasion of the

wounds by Schizophyllum commune. *Recommended measures to prevent damage comprise thinning out the crowns over several years, pruning and training grafted trees to form small open crowns, and cleaning the wounds and treating with a wound-healing preparation.*

119. Mazur, O. P., and N. M. Shemokhanova. 1965. [EFFECT OF FOREST SOIL ON DEVELOPMENT OF SEEDLINGS OF PERSIAN WALNUT IN THE FIRST YEAR OF LIFE.] Izv. Akad. Nauk. Ser. Biol. 3: 428-431. [In Russian with English summary.]
Inoculating irrigated meadow-bog serozem with soil from a forest of Persian walnut increased formation of endotrophic mycorrhizae in the seedlings and also increased their growth.

120. Micke, G. 1973. [CULTIVATION OF WALNUT IN FORESTRY OF GERMAN DEMOCRATIC REPUBLIC.] Soz. Forstwirtsch. 23(5): 150-151. [In German.]
Not seen.

121. Miller, William E. 1973. INSECTS AS RELATED TO WOOD AND NUT PRODUCTION. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 91-96. North Cent. For. Exp. Stn., St. Paul, Minn.
The more important insects affecting wood and nut production are named and briefly discussed. Wood crop insects mar tree form or impair incremental growth by retarding or spoiling it. Walnut production practices may at times unintentionally increase insect numbers. Nonchemical control or regulation measures are highlighted New information about insects is not keeping pace with progress in other aspects of walnut production technology.

122. Millikan, D. F. 1972. PROPAGATION OF JUGLANS SPECIES BY FALL GRAFTING. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 41-44, illus.
Selected varieties of Juglans *species can be propagated by bench grafting in the fall followed by a 3- to 4-week callusing period at 26° C in moist, sterilized sawdust. The grafts are then stored at 2° C until the completion of the dormancy period when they can be planted. Scionwood must be mature and the relative humidity in storage sufficiently high to prevent desiccation.*

123. Milovanova, L. V., and I. P. Radušinskaja. 1969. [THE BIOCHEMICAL CHARACTERISTICS OF THE MOLDAVIAN FORMS OF WALNUT AND ALMOND.] Tr. Mold. Nauchn.-Issled. Inst. Sad. Vinograd. Vinodel. 15: 292-298. [In Russian.]
During 5-yr studies the oil content in 44 walnut forms and the protein, P, and K contents in 15 of them, were determined and are tabulated.

124. Muller, C. H. 1969. ALLELOPATHY AS A FACTOR IN ECOLOGICAL PROCESS. Vegetatio 18: 348-357.
Not seen.

125. Munteanu, C., and M. Kalo. 1971. [SOME BIOCHEMICAL ASPECTS OF PARASITISM IN LORANTHACEAE. AMOUNT OF TOTAL AND REDUCING SUGAR IN VISCUM ALBUM L. AND IN ITS HOST, JUGLANS NIGRA L.] Cluj Univ. Babes-Bolyai Stud. Ser. Biol. 16(2): 69-75. [In Romanian with English summary.]
Seasonal variations of total and reducing sugar are tabulated for stems and leaves of Viscum album *L. and those of its host plant,* Juglans nigra *L. Differences in reducing sugar in parasite and host plant, on one hand, and in parasite and in control plant on the other were more pronounced than the variations in the total sugar. A comparison of the sugar content in mistletoe parasitizing different hosts revealed that the nature of the host had an evident influence upon the carbohydrate content of the parasite.*

126. Naughton, Gary G. 1973. EVALUATING ECONOMIC MATURITY OF INDIVIDUAL TREES. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 97-100. North Cent. For. Exp. Stn., St. Paul, Minn.
The decision to cut a walnut tree should be carefully weighed in terms of its present value as opposed to its future value. Maximum economic yield is possible when each tree is evaluated as an individual in terms of its own quality, size, and growth rate. Instructions are given for the use of a graph to find the compound earning rate and examples show the effects of pruning and release.

127. Nedev, N. V. 1970. [SOME PROBLEMS OF WALNUT GRAFTING BY BUDDING IN SPRING.] Grad. Lozar. Nauk. 7(2): 3-9. [In Bulgarian with French and Russian summaries.]
In trials carried out in 1964 and 1966, it was shown that success in spring budding of walnuts depended chiefly on the temperature and on the development of the rootstocks. The air temperature should be above 12 to 14° C, and the rootstocks should

be growing and with bark easily separable from the wood. The greatest degree of success was obtained using bud-sticks that had been selected earlier in the year and stored. Shortening the rootstocks had no effect on bud take, but favorably affected the growth of the scion shoots.

128. Nedev, N. V. 1971. [SEVERAL PROBLEMS ON ROOTSTOCKS OF WALNUTS.] Ovoshtarstvo 18(3): 11-14.
Not seen.

129. Nedev, N. V. 1972. [EFFECT OF SCIONS IN COMMON, EASTERN BLACK, AND MANCHURIAN WALNUTS ON ROOTSTOCKS DURING FIRST AGING PERIOD AND AT BEGINNING OF SECOND AGING PERIOD. I. GROWTH BEHAVIOR OF TREES.] Grad. Lozar. Nauk. 9(8): 15-24. [In Bulgarian.]
Not seen.

130. Nedev, N. V. 1973. [EFFECT OF SCION IN ROOTSTOCKS OF COMMON, EASTERN BLACK, AND MANCHURIAN WALNUTS DURING FIRST AGING PERIOD AND AT BEGINNING OF SECOND AGING PERIOD. II. REPRODUCTIVE BEHAVIOR OF TREES.] Grad. Lozar. Nauk. 10(1): 3-8. [In Bulgarian.]
Not seen.

131. Nedev, N. V., and Kh. Baev. 1971. [DEVELOPMENTAL FEATURES OF GENERATIVE ORGANS OF SEVERAL VARIETIES OF WALNUTS.] Grad. Lozar. Nauk. 8(7): 3-8. [In Bulgarian.]
In 17-yr-old grafted trees of two walnut varieties, secondary flowering was observed and both male and female flowers occurred in the same inflorescences. This is a varietal characteristic occurring mainly where the male flower buds are killed by frost.

132. Nedev, N., P. Prodanski, and S. Dzhondzhorova. 1971. [THE PROTEIN CONTENT AND AMINO ACID COMPOSITION OF KERNELS IN SOME VARIETIES OF WALNUT, JUGLANS REGIA.] C. R. Acad. Sci. Agric. Bulg. 4(3): 295-298. [In Russian.]
The raw protein contents in the kernels of three walnut cultivars are given. Of the essential amino acids, lysine, threonine, and methionine + valine occurred in the highest concentrations.

133. Nelson, Neil Douglas. 1973. EFFECTS OF AMOUNTS OF PARENCHYMA ON QUANTITY OF PHENOLIC EXTRACTIVES PRODUCED DURING FORMATION OF HEARTWOOD IN JUGLANS NIGRA AND QUERCUS RUBRA. Ph.D. Diss. on file in the Dep. of For., Univ. of Wis., Madison, Wis. 249 p., illus.

Amount of total heartwood extractives varied substantially between trees of J. nigra; *this variation was not related to rate of radial growth. Amounts of total, and total phenolic, heartwood extractives exhibited marked variation radially within trees; this variation was strongly and positively related to the number of rings from pith. Relative volumes of parenchyma varied substantially between and within trees. Between-tree differences were related to rate of radial growth in only a few cases. Relative volumes of parenchyma were not related to between-tree variation in amounts of total extractives. By eliminating amount of parenchyma as a control mechanism, the results pointed to metabolic control of rate and duration of aromatic biosynthesis within each parenchyma cell as being the primary determinant of amount of phenolic extractives produced. Geneticists should not attempt to control the amount of heartwood extractives in hardwood species by selecting for high or low relative volumes of parenchyma.*

134. Nenyukhin, V. N. 1972. [VARIABILITY OF NUTS OF JUGLANS REGIA L. WITHIN ITS POPULATION.] Rastit. Resur. 8(1): 60-68. [In Russian.]
Marked polymorphism was observed in the nuts of an artificial population of J. regia *from different plantings. A relationship was found between the age of the plantings and nut and kernel weight and shell thickness, which decreased with increasing plantation age. Curvilinear correlations were established between kernel percentage and nut weight, kernel percentage and shell thickness, and kernel weight and internal septum weight. The greatest variability within a tree was found in nut and kernel weights, and the smallest in the length of the nut.*

135. Newman, James A. 1972. WEED CONTROL FOR WALNUT SEEDLINGS. Univ. Ky. Dep. For. Rep. FOR-3, 2 p., illus.
Discusses weed control in young black walnut plantings.

136. Nikitinskii, Yu. I. 1970. [BIOLOGICAL AND ECOLOGICAL PRINCIPLES OF MANAGEMENT IN JUGLANS REGIA FORESTS.] Izdatel'stvo Ilim, Frunze, 210 p. [In Russian.]
A monograph on the natural J. regia *forests of Kirghizia, describing: environmental conditions, past history and present status, biological and ecological characteristics of* J. regia, *forest types, organization of seed production, plantations,*

felling in plantations and natural forests, etc. The monograph is a revised and enlarged version of a book already noticed.

137. Nikitinskii, Yu. I. 1970. [DICHOGAMY OF JUGLANS REGIA AND ITS PRACTICAL IMPORTANCE.] In The fruiting of *Juglans regia, Picea schrenkiana,* and *Juniperus* spp. in the Tien-Shan. Izdatel'stvo Ilim, Frunze, 137 p. [In Russian.]
Not seen.

138. Nikitinskii, Yu. I. 1970. [GROWTH AND DEVELOPMENT OF PLANTATIONS OF JUGLANS REGIA UNDER CANOPY.] In Afforestation of non-irrigated and irrigated land in Kirghizia. Izdatel'stvo Ilim, Frunze, 79 p. [In Russian.]
Not seen.

139. Nikitinskii, Yu. I. 1970. [INHERITANCE OF PROTEROGYNY AND PROTERANDRY IN JUGLANS REGIA.] In The fruiting of *Juglans regia, Picea schrenkiana,* and *Juniperus* spp. in the Tien-Shan. Izdatel'stvo Ilim, Frunze, 137 p. [In Russian.]
Not seen.

140. Nikitinskii, Yu. I. 1970. [THE RELATION BETWEEN HEARTWOOD FORMATION AND DEFECTS IN JUGLANS REGIA.] In Afforestation of non-irrigated and irrigated land in Kirghizia. Izdatel'stvo Ilim, Frunze, 79 p. [In Russian.]
Not seen.

141. Ogienko, A. P. 1971. [REPRODUCTION OF JUGLANS REGIA.] Lesn. Khoz. 10: 91-92. [In Russian.]
Not seen.

142. Ohta, A. 1973. ISOLATION OF NAPHTHAZARIN FROM WALNUT 'ONIGURUMI' AND ITS INHIBITORY ACTION ON OXIDATIVE PHOSPHORYLATION IN MITOCHONDRIA (JUGLANS MANDSHURICA MAXIM). Toxicon 11(3): 235-241.
Investigations of lethal substances other than juglone in the walnut 'Onigurumi,' led to the isolation and identification for the first time, of 5,8-dihydroxy-1,4-naphthaquinone (naphthazarin) in plants. Naphthazarin had a complicated dualistic effect acting both as an uncoupler and an energy transfer inhibitor, while juglone was only an energy transfer inhibitor.

143. Ölez, H. 1971. [AN IMPROVED METHOD FOR DETERMINING THE POTENTIAL YIELD OF WALNUT TREES.] Yalova Bahçe Kült. Araştirma Eğitim Merkezi Derg. 4(1/4): 20-30. [In Turkish with English summary.]
*The forthcoming yield of 48 (*Juglans regia*?) trees of different ages was successfully calculated in two successive years from the percentages of terminal and lateral buds producing pistillate flowers and the available numbers of pistillate flowers per terminal and lateral bud.*

144. Ölez, H. 1971. [STUDIES ON THE SELECTION OF WALNUT, JUGLANS REGIA, IN THE MARMARA REGION.] Yalova Bahçe Kült. Araştirma Eğitim Merkezi Derg. 4(1/4): 7-20. [In Turkish with English summary.]
The selection of 20 walnut types from 323 promising trees is described, and data on the form and growth of the trees, yield potential, flowering habit (protrandous, etc.), and fruit characteristics are tabulated.

145. Olisaev, V. A., and M. A. Tekoev. 1971. [ON RAISING PLANTING STOCK OF JUGLANS REGIA.] Lesn. Khoz. 10: 7-9. [In Russian.]
Not seen.

146. Oprea, C. 1969. [A STUDY OF THE MORPHOLOGY OF THE WALNUT FRUIT.] Lucr. Stiint. Inst. Agron. "N. Bălcescu," B, 12: 321-333. [In Romanian with English summary.]
*The structure of the fruit (*Juglans regia*?) is described and illustrated.*

147. Orlova, N. A. 1970. [FEATURES OF THE FLOWERING AND FRUITING OF JUGLANS SPP. IN N. KIRGHIZIA.] In The fruiting of *Juglans regia, Picea schrenkiana,* and *Juniperus* spp. in the Tien-Shan. Izdatel'stvo Ilim, Frunze, 137 p. [In Russian.]
Not seen.

148. Parker, J. 1969. FURTHER STUDIES OF DROUGHT RESISTANCE IN WOODY PLANTS. Bot. Rev. 35: 317-371.
A review with 288 references. Soil moisture effects are briefly covered. Juglans *and* Platanus *spp. are included.*

149. Parrot, Louis. 1969. [THE NEED FOR A TREE-BREEDING PROGRAM FOR CERTAIN HARDWOOD-FOREST SPECIES: APPLICATIONS IN THE GENERA JUGLANS AND ACER.] For. Chron. 45(6): 386-392. [In French with English summary.]
In a black walnut provenance-study plantation in Quebec, spring frost damage during the first 2 yr was strongly correlated with latitude of seed origin. No trees originating in Canada were damaged; frost injury to trees from U.S. collections ranged from 9 percent (Vermont) to 87 percent (Tennessee).

150. Parrot, Louis. 1971. [CLIMATE, A SELECTION FACTOR IN THE GENETIC ADAPTATION OF JUGLANS NIGRA, AN EXOTIC SPECIES IN QUEBEC, CANADA.] Silvae Genet. 20(1-2): 1-9, illus. [In French with English summary.]

Field test of four provenances of black walnut was established during the years 1882-1884 at Pointe Platon, near Quebec, Canada. Following severe mortality at the seedling stage due to frost damage, the residual plantation, which was established on three river terraces, subsequently formed several well-defined populations as a result of genotype-environment interaction. These populations showed strong variation in degree of frost resistance. The best stems exhibit an increment and quality comparable with that for the species in the central United States.

151. Paul, Benson H. 1943. BLACK WALNUT FOR GUNSTOCKS. South. Lumberman 166(2089): 32-36.

Properties of open- and forest-grown black walnut from six States were related to growing conditions. Open-grown trees had heavier, harder wood and less variable moisture content than forest-grown trees. There were no differences in straightness of grain.

152. Petrosjan, A. A. 1970. [VARIATION IN WALNUTS PROPAGATED BY SEED.] Sadovod. Mosk. 10: 26-27. [In Russian.]

In trials with 30 forms of 5- to 9-yr-old trees of Juglans regia *propagated from seed, variations were observed in type and time of flowering and of bearing, yields, time of fruit ripening, initiation and termination of seasonal growth, pest and disease resistance, winter hardiness, morphological characteristics of the tree, and commercial quality of the nuts.*

153. Petrosjan, A. A., and G. A. Antonenko. 1972. [SECOND FLOWERING AND CROPPING IN WALNUT.] Subtrop. Kul't. 2: 112-118. [In Russian.]

Ten trees obtained from seedlings of different walnut varieties and capable of flowering and fruiting twice a year were studied for 6 years. The trees that started bearing in the third year flowered normally in late April and early May and again in late May and early June. The second inflorescences (35 to 50 cm long), produced on short green shoots of the current year's growth, consisted of staminate, pistillate, staminate and pistillate, or hermaphrodite flowers. The fruits from the second flowering ripened almost simultaneously with those from the first but were slightly smaller. Each type of inflorescence is described and the economic possibilities of a wider distribution of this type of walnut tree are discussed.

154. Petukhova, I. P. 1971. [VARIATION IN 'CATALASE QUALITY' IN TWO SPECIES OF JUGLANS.] Bjul. Gl. Bot. Sada 79: 62-65. [In Russian.]

Seasonal variations in 'catalase quality' (number of active molecules per gram-molecule of the enzyme) were determined in the leaves and bark of 2-yr seedlings of J. mandshurica *and* J. regia *grown at Vladivostok and the more severe climate of Sverdlovsk. The results (shown in graphs) confirm that variations in catalase quality can serve as an indication of winter hardiness.*

155. Petukhova, I. P. 1972. [GROWTH RHYTHM OF JUGLANS MANDSHURICA IN RELATION TO PLANT INTRODUCTION.] In Rasteniia Prirodnoi Flory Sibiri Dlia Zelenogo Stroitel's Tva, p. 117-181. [In Russian.]

Not seen.

156. Phares, Robert E. 1965. MINERAL NUTRITION OF FOREST TREE SEEDLINGS. Diss. Abstr. 25(9): 4930.

Includes results from a pot experiment with black walnut using forest and old-field soils collected in Iowa and Missouri. The walnut seedlings grew significantly better on the forest soils than on the old-field soils. Seedling growth on all of the soils, however, was improved by addition of fertilizers. Results of chemical analyses for 12 elements in the leaves of the walnut seedlings are also included in the report.

157. Phares, Robert E. 1973. MANAGING IMMATURE TREES FOR MORE HIGH-QUALITY LOGS AND RELATED PRODUCTS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 49-54, Illus. North Cent. For. Exp. Stn., St. Paul, Minn.

A general review of some of the basic cultural practices in managing immature black walnut trees is presented. It is proposed that potential crop trees be selected as early in the rotation as possible and cultured on an individual tree basis. Early release and thinning are also recommended for maintaining rapid growth. Study results show that pole-sized and small sawtimber-sized walnut trees also grow faster if released and thinned, but older sawtimber-sized trees show little or no response. Tentative stocking and spacing levels for

maintaining good growth and good nut production are presented. Corrective pruning and clear-stem pruning are necessary at appropriate times during the rotation to produce straight stems and high-quality wood. Research in progress indicates that fertilization also may be feasible for maintaining good growth.

158. Phares, Robert E., and Raymond F. Finn. 1972. USING FOLIAGE ANALYSIS TO HELP DIAGNOSE NUTRIENT DEFICIENCIES IN BLACK WALNUT. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 98-104, illus.

The presence or absence of nutrient deficiency symptoms can serve as a quick guide to the nutrient status of black walnut plantations or orchards. Deficiency symptoms for several essential nutrients are described and illustrated with color plates. Laboratory analyses should be made to verify suspected nutrient deficiencies. Tentative critical foliage nutrient levels are presented to aid in evaluating results of the laboratory analysis. Suggested procedures for collecting and processing leaf samples are also given.

159. Phares, Robert E., and Robert D. Williams. 1971. CROWN RELEASE PROMOTES FASTER DIAMETER GROWTH OF POLE-SIZE BLACK WALNUT. USDA For. Serv. Res. Note NC-124, 4 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.

Complete crown release more than doubled the diameter growth of pole-size black walnut trees in southern Indiana over a 10-yr period. Partially released trees grew about 50 percent more than unreleased trees. Most of the trees produced bole sprouts; however, the incidence of sprouting was higher and the sprouts were larger on the completely released trees than on the unreleased trees. Controlling understory growth had no significant effect on growth of the walnut trees.

160. Pieniazek, S. A. 1968. AUTUMN GRAFTING OF WALNUTS. Am. Nurseryman 128(1): 20.

In Poland, scions of black or English walnut are collected in early October, bench-grafted on dormant seedlings, and packed in a box maintained at 78 to 80° F for 3 weeks. Grafted plants can then be field-planted or put into cold storage until spring. Up to 90 percent success is claimed for the method.

161. Prutenskaja, M. D., and V. S. Ševčenko. 1970. [GRAFTING LARGE JUGLANS REGIA TREES.] Lesn. Khoz. 7: 35-36. [In Russian.]

Rind (crown) grafts were made on decapitated stems in 20-yr plantations in Kirghizia. Details of the technique and of subsequent graft survival are given. Although the grafting was done with great care, survival after 4 yr was <40 percent, and it is concluded that this method is unsuitable for large-scale improvement of nonvarietal plantations or natural forests of J. regia. *Instead, such stands should be improved by removing inferior and unhealthy trees.*

162. Prutenskaja, M. D., and V. S. Ševčenko. 1971. [THE HARMFULNESS OF A LEAF-BLOTCH DISEASE OF JUGLANS REGIA, AND MEASURES TO CONTROL IT IN S. KIRGHIZIA.] Mikol. i Fitopatol. 5(2): 172-175. [In Russian.]

Data are given showing the harmful effect of the disease (pathogen Gnomonia [leptostyla], *conidial stage* Marssonina juglandis*) on shoot growth and fruit weight. Some interspecific hybrids of* J. regia *with* J. nigra, J. cinerea, *and* J. sieboldiana *have proved to be immune, as have forms of* J. regia *introduced into Kirghizia from other regions of the U.S.S.R.*

163. Ramina, A. 1970. [STUDIES ON THE FLORAL BIOLOGY AND FRUITING OF WALNUT (JUGLANS REGIA). III. BIOMETRIC AND CHEMICAL DETERMINATIONS ON THE FRUIT DURING GROWTH.] Riv. Ortoflorofruttic. 54: 293-300. [In Italian with English summary.]

*The growth in length and width of the fruit of Sorrento walnuts (*J. regia*) followed a double sigmoid curve; it was very rapid at first, slowed down for several weeks (phase II), increased again, and finally leveled off. In both years of the study, the start of phase II corresponded with the onset of hardening of the endocarp, which took about 25 days. Changes in the water, N, P, K, and Ca contents of the fruit during its growth are described.*

164. Ramina, A. 1970. [RESEARCH ON FLORAL BIOLOGY AND FRUITING IN WALNUT (JUGLANS REGIA L.) IV. INFLUENCE OF LEAVES AND FRUITS ON FLOWER BUD INDUCTION.] Agric. Ital. 70(6): 383-397. [In Italian.]

Not seen.

165. Reitz, H. J., and W. C. Stiles. 1968. FERTILIZATION OF HIGH PRODUCING ORCHARDS. "CHANGING PATTERNS IN FERTILIZER USE." Soil Sci. Soc. Am. Symp. Proc., p. 353-378.

A summary review, with 13 references, of nutrient and fertilizer requirements of apple, citrus, and nuts.

166. Risser, Paul G., and Elroy L. Rice. 1971. PHYTOSOCIOLOGICAL ANALYSIS OF OKLAHOMA UPLAND FOREST SPECIES. Ecology 52(5): 940-945.
Black walnut is commonly associated with Cornus florida, Quercus alba, *and* Robinia pseudoacacia.

167. Roth, Paul L. 1972. FIELD TRIALS OF SELECTED HERBICIDES IN A YOUNG TREE PLANTATION. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 45-47.
On silt loam soils in southern Illinois, the best combination of weed control without injury to black walnut seedlings was provided by 6 lb simazine 80W plus 1/2 pt paraquat per acre applied before planting.

168. Roth, Paul L., Calvin F. Bey, John R. Toliver, and Richard K. Kammler. 1972. BLACK WALNUT SEEDLINGS FROM SOUTH GROW FASTEST IN SOUTHERN ILLINOIS. Agric. at South., Spring Issue, p. 3.
Results from studying seven characters in black walnut trees originating in various geographic areas and planted at several locations are summarized. No geographic area produced unusually large or small black walnut seed. Trees originating in southern areas tend to flush earlier in the spring, hold their leaves longer in the fall, grow larger, and produce more lateral buds on the current year's terminal than trees originating in northern areas.

169. Rudolph, V. J., W. A. Lemmien, and D. P. White. 1972. BLACK WALNUT STAND GROWTH IN SOUTHERN MICHIGAN. Mich. Agric. Exp. Stn. Res. Rep. 171, 11 p., illus.
The 10 black walnut plantations ranging in age from 19 to 56 yr, and the 60-yr-old natural stand for which data are presented in this report, show generally slow growth. These growth data also show that planting black walnut in mixtures with other species, or bordering walnut plantations with coniferous plantings, has little beneficial effect without additional cultural treatments.

170. Ruts'kyi, I. A. 1971. [CYTOGENETIC AND MORPHOLOGICAL EFFECT OF GAMMA-RAY ACTION AND ETHYLENEIMINE ON SEEDS OF JUGLANS REGIA.] In Eksp. Mutatsii Sel. Rosl., p. 238-246.
Not seen.

171. Šarova, N. I. 1970. [CONTENTS OF BIOLOGICALLY ACTIVE AND MINERAL SUBSTANCES IN WALNUTS.] Sb. Tr. Aspir. Molod. Nauchn. Sotr., Leningr. 15: 584-590. [In Russian.]
*Immature walnut (*Juglans regia*?) fruits sampled on 20 June contained 2,186 to 3,069 mg percent ascorbic acid, the kernels at harvest on 5 September contained 13 to 48 mg percent and after 4 months' storage 4.2 to 6 mg percent. The kernels also contained 1 to 1.5 mg percent tocopherol; rutin was found in milky-ripe but not fully ripe fruits. The* Fe_2O_3 *content of the kernels ranged from 3.16 to 6.03 mg percent and MgO from 0.22 to 0.52 mg percent.*

172. Schaad, N. W. 1969. ANATOMICAL RELATIONSHIPS OF THE PATHOGEN ERWINIA RUBRIFACIENS, TO THE TISSUES OF JUGLANS NIGRA L. Diss. Abstr. 30B(5): p. 1983.
Not seen.

173. Schaad, N. W., M. G. Heskett, J. M. Gardner, and C. I. Kado. 1973. INFLUENCE OF INOCULUM DOSAGE, TIME AFTER WOUNDING, AND SEASON OF INFECTION OF PERSIAN WALNUT TREES BY ERWINIA RUBRIFACIENS. Phytopathology 63(3): 327-329.
*Experimentally inflicted wounds of Persian walnuts (*Juglans regia *'Hartley') are susceptible to infection by* Erwinia rubrifaciens. *Trees were not susceptible during the winter (January), but were highly susceptible in spring (April), summer (July), and fall (October). Wounds decreased in susceptibility with time at the average rate of 10 to 12 percent/day. Seven days after wounding, fewer than 3 percent of wounds remained susceptible in April and October, and about 15 percent in July.*

174. Schaad, N. W., and E. E. Wilson. 1971. BACTERIAL PHLOEM CANKER OF PERSIAN WALNUT. Calif. Agric. 25(4): 4-7.
Describes the distribution in California, symptoms, spread, temperature requirements, etc., of this disease of cultivars of Juglans regia *caused by* Erwinia rubrifaciens. *Attacks are largely confined to the Hartley cultivars. Natural infection has not been found in* J. hindsii *or* J. californica. *Control measures are described.*

175. Schaad, N. W., and E. E. Wilson. 1971. ECOLOGY OF ERWINIA RUBRIFACIENS AND DEVELOPMENT OF PHLOEM CANKER OF PERSIAN WALNUT (JUGLANS REGIA). Appl. Biol. Ann. 69(2): 125-136.
A requisite for development of bacterial phloem canker is the presence of the highly susceptible Hartley cultivar. The age of the plant part is important in the disease, which occurs only on trunks and primary (scaffold) branches. Extension of the cankers was most rapid during the summer when the temperature was high. Breaks in the

thick phelloderm of the trunks and branches are necessary for penetration of the pathogen to the inner bark. Of the several types of breaks commonly occurring, those produced by mechanical harvesting equipment and by sap-sucking birds were found to be infection sites.

176. Schumann, David R. 1971. DIMENSION YIELDS FROM BLACK WALNUT LUMBER. USDA For. Serv. Res. Pap. FPL-162, 17 p. For. Prod. Lab., Madison, Wis.
Yield of dimension from top grades of walnut lumber can be predicted by charts. Various grades can be compared to determine the most economical mix for a specific cutting order.

177. Schumann, David R. 1973. DIMENSION STOCK YIELDS FROM LUMBER OF THREE HARDWOOD SPECIES. For. Prod. J. 23(3): 17-21.
The significance of recent dimension stock yield studies using hard maple, black walnut, and red alder, is discussed in light of its interest to manufacturers, consumers, and scientists. The data are useful in determining the most economical lumber grade(s) for specific requirements, facilitating more complete utilization of the resource by demonstrating maximum obtainable yield, and encouraging the use of the lower grades that are in greatest supply. The application of the data by use of a nomograph is illustrated, and the acceptance of the data and its relationship to associated research is summarized.

178. Schumann, David R. 1973. MECHANICAL, PHYSICAL, AND MACHINING PROPERTIES OF BLACK WALNUT FROM INDIANA AND MISSOURI. Wood & Fiber 5(1): 14-20.
Machining properties of black walnut were satisfactory regardless of locality, site, growth rate, and anatomical characteristics. Specific gravity influenced the machining and mechanical properties more than any other feature. Indiana-grown black walnut heartwood contained less extractive material and consequently shrank more than Missouri-grown wood. Good sites, regardless of location, produced tougher wood than poor sites.

179. Sdrawkow, K. 1973. [PRESENT SITUATION AND PROBLEMS CONCERNING CULTIVATION AND MANAGEMENT OF WALNUT TREES IN PEOPLE'S REPUBLIC OF BULGARIA.] Soz. Forstwirtsch. 23(5): 152-153. [In German.]
Not seen.

180. Serr, E. F. 1960. WALNUT ORCHARDS ON VOLCANIC SOILS DEFICIENT IN PHOSPHORUS. Calif. Agric. 14(6): 6-7.
Triple super placed in trenches 6 in. deep and 2 ft from the trunks of young trees and 5 ft from the trunks of mature trees significantly increased yields. Broadcasting fertilizer was not effective.

181. Sester, John A. 1973. FOREST PRODUCTS REGULATORY LEGISLATION. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 26-27. North Cent. For. Exp. Stn., St. Paul, Minn.
The intent of the Illinois Timber Buyers Licensing Act is to protect the landowner's right to receive monies due for timber sold, and to protect against timber piracy. The law requires anyone buying timber from the timber owner to be licensed. To obtain a license a surety bond must be posted. Amount of bonding surety is based on total timber purchases. Anyone transporting two or more logs or Christmas trees on any road in Illinois may be required to show proof of ownership under provisions of the Forest Products Transportation Act.

182. Shchepot'ev, F. L., and A. G. Gerasimenko. 1970. [ON APOMIXIS IN PERSIAN WALNUT.] In Apomiksis i Sel. p. 232-238. [In Russian.]
Not seen.

183. Shchepot'ev, F. L., and A. E. Kenig. 1971. [NUT TREE CULTURE (JUGLANS) IN UKRAINE.] Lesovod. Agrolesomelior. 25: 39-46. [In Russian.]
Not seen.

184. Shreve, Loy W. 1973. PROPAGATION OF WALNUT, CHESTNUT, AND PECAN BY ROOTED CUTTINGS. Eighth Cent. States For. Tree Improv. Conf., Columbia, Mo. 10 p.
Softwood cuttings from adventitious shoots and current-year seedlings of black walnuts were rooted under intermittent mist when treated with IBA in 95 percent ethanol. Rooting percentages of 80 to 100 were attained from shoots of adventitious origin with 1-, 3-, and 4-yr-old seedlings, and lower limbs of a 13-yr-old tree. Rooting percentages of cuttings made from current-year seedlings were similarly high. Seventy-three percent of rooted cuttings transplanted from the mist bed to containers in the greenhouse initiated shoot growth within 2 to 6 weeks after being transplanted.

185. Shreve, Loy W., and Neil W. Miles. 1972. PROPAGATING BLACK WALNUT CLONES FROM ROOTED CUTTINGS. Plant Propag. 18(3): 4-7.
Softwood cuttings from shoots originating from adventitious buds of black walnut were successfully rooted under intermittent mist when selected at the right stage of development and treated with 5,000, 8,000, or 10,000 p/m IBA in 95 percent ethanol. Rooting percents of 80 to 100 were attained using cuttings taken from shoots of adventitious origin from 1-, 3-, and 4-yr-old seedlings, a 135-yr-old stump, and lower limbs of a 13-yr-old tree. Rooting percents of cuttings made from terminals of current-year seedlings were similarly high. Seventy-three percent of rooted cuttings transplanted from the mist bed to containers in the greenhouse survived and initiated new growth.

186. Shuhart, D. V. 1932. INNER SCULPTURING OF THE FRUIT OF JUGLANDACEAE. Okla. Acad. Sci. Proc. 12: 17-18.
The original carpellary cavities are narrow slits with smooth walls. The carpellary tissue gives rise to a continuous endocarp, a more or less incontinuous mesocarp, and parenchymatous endocarp. The exocarp develops into the hard outer shell of the nut.

187. Shvidenko, A. I. 1970. [INJURIES CAUSED TO WALNUT TREES BY FROSTS IN BUKOVINA.] Lesovedenie 1: 89-90. [In Russian.]
Not seen.

188. Shvidenko, A. I. 1971. [GROWTH OF JUGLANS REGIA WITH OAK ON DRY OAK FOREST SITES.] Lesn. Khoz. 10: 10-12. [In Russian.]
Describes studies in mixed walnut/oak plantations in the forest-steppe region of the West Ukraine. The walnut, which has been deliberately favored by various silvicultural measures, has a greater height and diameter than oak at age 10 yr, but the oak eventually suppresses it, and these species should be regarded as incompatible for mixed plantations.

189. Simovski, K. 1972. [TIME OF WALNUT GRAFTING IN REGIONS OF SKOPJE (MACEDONIA).] Jugosl. Vocarstvo 6(10/20): 699-704. [In Croatian with English summary.]
Not seen.

190. Sladký, Z. 1972. THE ROLE OF ENDOGENOUS GROWTH REGULATORS IN THE DIFFERENTIATION PROCESSES OF WALNUT (JUGLANS REGIA L.). Biol. Plant. 14(4): 273-278.
Further bioassays of auxins and gibberellin-like substances were made on developing buds, young fruits, and mature leaves of a tree aged 40 yr, after separation by paper chromatography. Complex patterns of different growth regulators and inhibitors were revealed, and their significance is discussed. The development of bud primordia in the second year after spraying the young leaves with active substances showed that: IAA or MH (maleic hydrazide) made male flowers revert to vegetative buds that developed abnormal leaves resembling those of the more primitive family Fagaceae; triiodobenzoic acid transformed vegetative buds in the male catkins; male catkins formed some female flowers after higher doses of IAA; and female flowers were not affected by treatment (presumably owing to high concentrations of endogenous substances), but fruit development was distorted.

191. Smagin, N. E. 1970. [FROST RESISTANT FORMS OF WALNUT.] Sadovodstvo 11: 31. [In Russian.]
*Of 2,500 walnut (*Juglans regia*?) trees studied in 1968-1969, 40 were only slightly damaged at -30° C, and 12 of these that showed good commercial qualities were selected.*

192. Smith, Christopher C., and David Follmer. 1972. FOOD PREFERENCES OF SQUIRRELS. Ecology 53(1): 82-91.
Both fox and gray squirrels prefer shelled black walnut kernels over shagbark hickory or any of four species of oak kernels. Approximately 15 min was required to open and eat a fresh whole walnut. Coevolution of squirrels and most species is discussed.

193. Smith, H. H., and O. W. Torgeson. 1956. KILN SCHEDULE FOR BLACK WALNUT GUNSTOCK BLANKS. USDA For. Serv. Rep. FPL-R1433. For. Prod. Lab., Madison, Wis.
A proposed commercial kiln schedule, faster and hotter than previously published schedules, is limited by prohibitive degrade as higher temperatures are reached. A top temperature of 165° F is recommended.

194. Smith, Richard C. 1973. RETURNS FROM TWO SYSTEMS OF MULTICROPPING. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 106-110. North Cent. For. Exp. Stn., St. Paul, Minn.
An analysis was made of costs and returns from two hypothetical black walnut plantations of different spacings in which fescue was grown for seed between the rows of trees

and nuts were sold. Fescue seed and nuts contributed a substantial share to total revenue. After allowance for all costs including income taxes, the internal rates of return were 8.3 and 12.9 percent respectively for the 18- by 18- and 40- by 40-ft spacings. Benefit-cost ratios were 1.39 and 1.67, based on a 6 percent discount rate. With the cost of land and initial costs of establishment assumed, $15,000 to $16,000 would be required to start a 40-acre plantation.

195. Stebbins, Robert L. 1973. USE OF LEAF ANALYSIS FOR WALNUTS AND FILBERTS. Nut Grow. Soc. Oreg. Wash. Proc. 58: 37-42.
Summarizes trends in number of leaf samples sent in by walnut (probably Juglans regia*) and filbert growers in Oregon that show deficiencies of nitrogen, potassium, and boron. Deficiency levels for each of these mineral nutrients are also given for both tree species. The levels of nitrogen in samples sent in by growers in recent years have been declining, probably because more ammonium-type fertilizers are being used and there is less nitrification with acidification of the soils.*

196. Stone, Donald E. 1970. EVOLUTION OF COTYLEDONARY AND NODAL VASCULATURE IN THE JUGLANDACEAE. Am. J. Bot. 57(10): 1219-1225.
Increased nodal complexity in the Juglandaceae is associated with at least two independent evolutionary shifts from epigeal to hypogeal germination. Presumably the complex development of the cotyledonary node is a response to increased functional demands of hypogeous cotyledons.

197. Sushko, M. T. 1970. [POLYMORPHISM OF JUGLANS REGIA L. IN THE PAMIRO-ALAI MOUNTAIN COUNTRY AND IN THE PAMIRS.] Rastit. Resur. 6(3): 383-390. [In Russian.]
The great diversity of Juglans regia *types found in these regions is of interest for both commercial use and breeding.*

198. Sushko, M. T. 1973. [DETAILS, ORIGIN AND STRUCTURE OF BURLS IN JUGLANS REGIA.] Rastit. Resur. 9(1): 118-123. [In Russian.]
Not seen.

199. Sushko, M. T. 1973. [JUGLANS MANSHURICA AND ITS SUPPLY IN SOVIET FAR EAST.] Rastit. Resur. 9(2): 271-279. [In Russian.]
Not seen.

200. Szopa, P. S., D. E. Hartley, and A. E. McGinnes. 1973. HARDWOOD BARK-AMENDED SOIL AS A POTTING MEDIUM FOR CONTAINER-GROWN CHRYSANTHEMUMS. For. Prod. J. 23(1): 43-46.
Hammermilled bark from seven hardwood species was studied as a possible alternate for peat moss in the production of potted chrysanthemum plants. In general, plants grown in bark-amended mixes were less succulent (more "woody") and had fewer flowers. The pH of bark-amended soils was higher than peat-amended soils, often above pH 7.0 and approaching undesirable levels for optimum nutrient uptake. Walnut, maple, and sycamore bark yielded more satisfactory plants than oak or ash bark.

201. Tastvoreva, O. G. 1966. [THE MOISTURE REGIME OF SOILS UNDER STANDS OF SOME TREE SPECIES ON FOREST STEPPE.] Vestn. Leningr. Inst. 15: 135-146. [In Russian.]
Moisture regime was studied under pure stands, 25 yr old, density 1.0, height 8 to 11 m, of petiolate oak, Siberian larch, Amur cork tree, and Manchurian walnut. Mean rainfall was 390 to 620 mm, soil clay content 20 to 30 percent, porosity 48 percent. Penetration of moisture was greatest under cork and walnut; most of the moisture coming from thawed snow. The lowest moisture supply was found under larch; the highest under walnut and cork. Under walnut and cork a soil layer with high moisture content (16 to 20 percent) was found at 2 to 4 m depth.

202. Taverna, G. 1968. [THE ACTIVITY OF 5-OXY-NAPHTHOQUINONE IN THE METABOLISM OF THE JUGLANDACEAE. III.] Fac. Sci. Agrar. Napoli Ann. 3: 292-298. [In Italian with English summary.]
Juglone was detected in all the green parts of a J. regia *tree; i.e., in the inflorescence, stem cortex, leaves, and fruit husk. The total content of juglone in the husk generally increased between 6 May and 26 September although on dry and fresh weight bases the content decreased; the amount present depended on the size of the fruit and not on the date. Shading the fruit with black paper and defoliating the fruiting branch slightly delayed fruit growth but completely prevented the accumulation of juglone in the husk. This finding and the fact that leaves of fruiting branches were the richest in juglone support the idea that the juglone of the fruit is elaborated partly in the husk and partly in the adjacent leaves, and that the synthetic process is light dependent.*

203. Tsurkan, I. P., and E. I. Chebotar'. 1972. [WHIP-GRAFTING WALNUTS.] Sadovostvo 10: 30-31. [In Russian.]
Walnut seedling rootstocks with a stem diameter of 1.2 to 1.5 cm were lifted in late autumn and heeled in. Scion cuttings were taken from the mother tree shortly before grafting. The rootstocks and scions were kept in moist sawdust at 26 to 28° C for 10 to 15 and 2 to 3 days, respectively. After bench grafting at monthly intervals from December to April, the grafts were stratified in fungicide-treated moist sawdust in boxes at 26 to 28° C. Callusing occurred in 10 to 15 days. Maximum and minimum callusing occurred in plants grafted in December and in March to April, respectively. The callused material stored satisfactorily at 0 to +2° C until planting in early May. Outplanting and aftercare are described.

204. Tucović, A., L. Marković, and V. Valčić. 1972. [PRELIMINARY RESULTS OF EARLY PROVENANCE TESTS OF WALNUT (JUGLANS REGIA L.) IN YUGOSLAVIA.] Acta Biol. Iugosl. Ser. F Genet. 4(2): 229-244. [In Croatian with English summary.]
Trees from 14 locations in 4 different climatic regions in Yugoslavia were established in 2 nurseries. The largest trees originated in the Ba-Ljig region. The proportion of monoaxial plants varied in accordance with the geographical latitude and height above sea level.

205. Uriu, K., and D. H. Chaney. 1970. FOLIAR SPRAYS FOR CORRECTING ZINC DEFICIENCIES IN WALNUTS. Calif. Agric. 24(3): 10-11.
Treatments to trees with Zn deficiency symptoms were: (1) $ZnSO_4$ applied in 1966, (2) $ZnSO_4$ + hydrated lime applied once in 1966 and once in 1968, (3) $ZnSO_4$ + hydrated lime twice in 1966 and twice in 1968, and (4) Zn EDTS four times in 1966 and twice in 1968. Deficiency correction was best with (4) and nearly as good with (3).

206. Veihmeyer, F. J. 1972. THE AVAILABILITY OF SOIL MOISTURE TO PLANTS: RESULTS OF EMPIRICAL EXPERIMENTS WITH FRUIT TREES. Soil Sci. 114(4): 268-294, illus.
Portions of this article describe a 24-yr study to determine the effect of five moisture regimes on the growth of Concord walnuts with northern black walnut rootstock. Moisture regimes ranged from no irrigation (soil allowed to dry out) to frequent irrigation (soil at or above field capacity). There was no significant treatment response on yield of walnuts, growth and size of walnuts, or growth of the trees. Lack of treatment response was attributed to large amounts of soil moisture in the upper 6 ft of soil that was not depleted before most of the annual growth had been completed.

207. Vernik, R. S. 1961. [ECOLOGICAL CONDITIONS OF GROWTH OF WALNUT-FRUIT-TREE FORESTS IN THE BOSTANDŸK REGION OF UZBEKISTAN.] Bot. Zh. 45: 1766-1773. [In Russian.]
Even on southern slopes of the Ugam mountain range the soil-moisture content at the driest time of the year was greater than the wilting coefficient of walnut on brown forest soil when the soil was deep. On southern slopes that were bare or were eroded and planted with almond, soil moisture was insufficient.

208. Vernik, R. S. 1970. [EXPENDITURE OF WATER IN TRANSPIRATION BY WALNUT FOREST IN THE UPPER REACHES OF THE CHIRCHIK VALLEY.] Lesovedenie 5: 21-26. [In Russian with English summary.]
Tabulates details of the transpiration of Juglans regia, Prunus [sogdiana], Crataegus [turkestanica], *and the herb layer in seven different walnut forest types in the West Tien Shan Mountains. Water expenditure in transpiration is compared with mensurational data for the stands, and conclusions are drawn on the optimum stand composition and constitution as regards forest productivity.*

209. Vinogradov, N. P. 1970. [THE (NUT) YIELD OF THE WALNUT STANDS OF S. KIRGHIZIA.] In The fruiting of *Juglans regia, Picea schrenkiana,* and *Juniperus* spp. in the Tien-Shan. Izdatel'stvo Ilim., Frunze, 137 p. [In Russian.]
Not seen.

210. Vinogradov, N. P., and V. A. Vinogradov. 1971. [BREEDING AND REPRODUCTION OF JUGLANS REGIA IN SOUTHERN KIRGHIZIA.] Lesn. Khoz. 10: 83-85. [In Russian.]
Not seen.

211. Vishanska, Yu. V., and S. Ivanov. 1972. FATTY ACID COMPOSITION OF THE OILS OF SOME LOCAL WALNUT VARIETIES. C. R. Acad. Agric. Georgi Dimitrov 5(3): 213-215.
Kernel oil content and fatty acid composition of the oil, including the ratios of linoleic:linolenic acids, were studied in five Bulgarian varieties.

212. Vonica, I. 1972. [THE WALNUT-TREE ANTHRACNOSIS CAUSED BY GNOMONIA LEPTOSTYLA (FR.) CES. ET DE NOT. AND THE WAY OF CONTROLLING IT.] Rev. Hortic. Vitic. 20(5): 82-86. [In Romanian with English summary.]

The biological cycle of the pathogenic agent was studied and it was found that the transmission of the disease from year to year is performed only through the intermediary of the perfect form and that many conidia producing secondary infections develop on the organs attacked, during the vegetation period. As a function of the fungus biology, the walnut phenology and the climatic conditions, three to six treatments are required, in most years the first treatment being applied during ament formation, for blocking the first primary infections. Most effective were the copper-based products and the organically synthesized ones.

213. Vrcelj-Kitic, Darinka. 1968. [BLACK WALNUT (JUGLANS NIGRA L.) IN SERBIA.] Zbornik 8: 63-86, illus. [In Serbian with English summary.]

Ecological conditions and development of black walnut in four plantations in Yugoslavia are described. A 54-yr-old plantation on dunes of deep sandy loam averages 20.5 m tall. On very deep chernozem soils, three plantations 32 to 35 yr old range from 19.8 to 22.0 m tall.

214. Wahlgren, H. E. 1973. EVALUATION OF SELECTED WOOD PROPERTIES IN RELATION TO SOIL-SITE CONDITIONS. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 17-22. North Cent. For. Exp. Stn., St. Paul, Minn.

Relationships in black walnut wood color, specific gravity, extractive content, anatomical characteristics, machining, and mechanical properties were explored. The influence of geographic location, site quality, and growth conditions on these properties was also examined. Luminance was related to extractive content and to the combination of extractive content and some measures of wood density. Indiana trees differed significantly from Missouri trees by having: higher luminance value, lower extractive content, greater shrinkage, higher proportion of fibrous tissue with thinner cell walls, and smaller vessel lumens. No differences were detected in the physical characteristics or properties between trees from the two States.

215. Weeks, Jack. 1973. BLUEGRASS SOD AND TREES. In Black walnut as a crop. Black Walnut Symp., Carbondale, Ill., Aug. 14-15, 1973. USDA For. Serv. Gen. Tech. Rep. NC-4, p. 84-85. North Cent. For. Exp. Stn., St. Paul, Minn.

Profit was the motive when 80 acres of black walnuts were planted 11 yr ago. Since then I have learned a great deal about walnuts and as yet have received no profit; however, I harvested 8,600 pounds of fine-quality nuts last year. I expect to start making a small profit in the next 2 or 3 yr. Using bluegrass as a second crop in the orchard has brought a reasonable return on the land while the trees grow into bearing and will play a great part in the future profits from this operation.

216. Wichman, J. R., and W. R. Byrnes. 1971. INHERENT TOLERANCE OF BLACK WALNUT AND TULIP POPLAR SEEDLINGS TO SOIL-APPLIED HERBICIDES. Purdue Univ. Agric. Exp. Stn. Res. Bull. 878, 6 p.

Black walnut and tulip poplar seedlings were evaluated for their tolerance to simazine, atrazine, and diuron. One- and 2-yr-old nursery-grown seedlings as well as newly germinated seedlings grown in a sand or sand-vermiculite medium were treated with the herbicides in a greenhouse environment. Two-yr-old tulip poplar was tolerant to simazine at 0.25 p/m, but showed little or no tolerance to higher concentrations. Little tolerance was observed for tulip poplar to atrazine and diuron. In contrast, 1-yr-old black walnut was tolerant to 0.25, 0.50, and 1.00 p/m levels of simazine and to 0.25 p/m concentrations of atrazine and diuron. The response of newly germinated tulip poplar to simazine closely paralleled barley, a simazine-sensitive species; whereas the response of black walnut paralleled that of corn, a simazine-tolerant species. Chromatograms of foliar extracts indicated that black walnut was able to degrade simazine to at least four unidentified metabolites.

217. Williams, Robert D. 1971. THE EFFECT OF SEASON OF SOWING, STORAGE TREATMENT, AND HULLING ON GERMINATION AND GROWTH OF BLACK WALNUT SEED. Tree Plant. Notes 22(3): 21-22.

The experiments reported showed that autumn-sown Juglans nigra *seed produced more and larger seedlings than spring-sown at most Central States nurseries. Removing the husks of the nuts did not affect seedling yield, but reduced the volume of seed*

by about two-thirds, making the seed easier to store and stratify.

218. Williams, Robert D. 1972. ROOT FIBROSITY PROVES INSIGNIFICANT IN SURVIVAL, GROWTH OF BLACK WALNUT SEEDLINGS. Tree Plant. Notes 23(3): 22-25, illus.
In test plantings with black walnut in Illinois and Indiana, fibrous rooted seedlings did not survive better or grow faster than single taprooted seedlings. Stem diameter appears a better indicator of early height growth than root fibrosity.

219. Williams, Robert D. 1972. STORING BLACK WALNUT SEED. North. Nut Grow. Assoc. Annu. Rep. 62(1971): 87-89, illus.
Several tests were made to develop effective storage methods for black walnut seed using seed collected in southern Indiana in 1965, 1967, and 1968. Major variables included storage facility, seed moisture content, storage temperature, and length of time in storage. The seed retained its viability better in outside pits than in cold rooms. With pit storage, seed viability could be maintained up to 2 yr in storage with little loss in germination. Seed moisture content was not as critical for pit storage as for coldroom storage. For storage at 37° F the best seed moisture content was 40 percent; at 19° F it was between 20 and 30 percent; and at -15° F it had to be reduced below 20 percent to maintain germination.

220. Williams, Robert D., David T. Funk, Robert E. Phares, Walter Lemmien, and Thomas E. Russell. APPARENT FREEZE DAMAGE OF BLACK WALNUT SEEDLINGS RELATED TO SEED SOURCE AND FERTILIZER TREATMENT. Tree Plant. Notes. (In press.)
Following exposure to 15° F temperature in early November 1971 in a southern Indiana nursery, many walnut seedlings were topkilled. Trees of Kentucky, Tennessee, and Alabama origin suffered about four times as much damage as those from Michigan. Seedlings fertilized with ammonium-type fertilizers were less severely affected than unfertilized seedlings or those treated with sodium nitrate. More than 60 percent of the injured seedlings died during the first growing season after outplanting.

221. Williams, Robert D., and Robert E. Phares. 1973. BLACK WALNUT SEEDLING PRODUCTION AND RELATED NURSERY RESEARCH. Northeast. Area Nurserymen's Conf. Proc., p. 15-22, illus.
A survey of 25 States growing black walnut planting stock shows that the demand for black walnut seed and seedlings increased throughout the 1960's. Seedlings shipped from the nurseries increased from about 729,000 in 1963 to more than 2.7 million in 1971. Annual shipments of seed and seedlings fluctuated greatly, primarily because of irregular seed supplies, root rot, and poor seed germination. Research related to these problems and to fertilization and weed control in black walnut seedbeds is discussed.

222. Wilson, E. E., M. P. Starr, and J. A. Berger. 1957. BARK CANKER, A BACTERIAL DISEASE OF THE PERSIAN WALNUT TREE. Phytopathology 47: 669-673, illus.
The disease is characterized by extensive, shallow, irregularly shaped cankers in the bark of the trunk and scaffold branches of mature trees. Cankers expand throughout the summer but are inactive in winter.

223. Wright, Ernest, and H. R. Wells. 1948. TESTS ON THE ADAPTABILITY OF TREES AND SHRUBS TO SHELTERBELT PLANTING ON CERTAIN PHYMATOTRICHUM ROOT ROT INFESTED SOILS OF OKLAHOMA AND TEXAS. J. For. 46: 256-262, illus.
Juglans nigra *is of intermediate susceptibility and is tentatively recommended for shelterbelts on sandy sites.*

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Dillow, Martha K.
1975. Bibliography of walnut--supplement No. 2. North Cent. For. Exp. Stn., St. Paul, Minn. 26 p. (USDA For. Serv. Gen. Tech. Rep. NC-13)

A supplement to Research Paper NC-9 published in 1966, and Research Paper NC-70 published in 1971, this list covers 223 additional references dealing with the growth and production of walnut.

OXFORD: 0(048.1):176.1(*Juglans nigra*).

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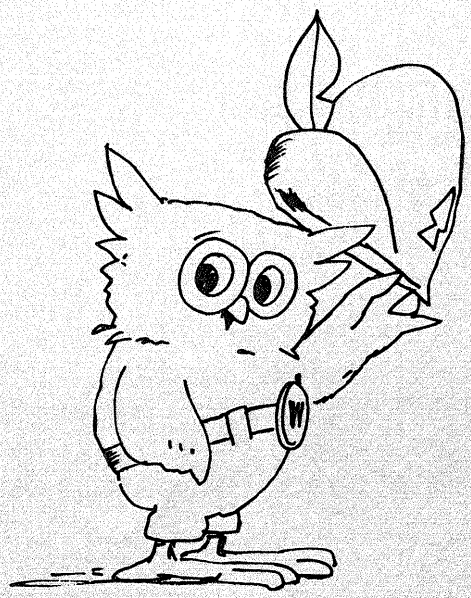

Nature is beautiful...leave only your footprints.