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ABSTRACTS OF REPORTS FROM THE

1974 WALNUT FARM ADVISORS' CONFERENCE

Mini-Center
University of California at Davis

January 30-31, 1974

Abstracts of Reports from the

1974 Walnut Farm Advisors' Conference

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P L A N T I M P R O V E M E N T

Walnut Yield Survey - W. Schreader, D. Ramos, H. Forde

At the conclusion of the 1973 Statewide Walnut Farm Advisors' Conference, Dave Ramos assigned me the primary responsibility of developing a method of determining the yield expectation of different varieties from existing records. It was hoped that perhaps such yield information was available in the records of the Diamond Walnut Growers and data collected by farm advisors statewide.

On August 2, 1973, I established a steering committee of farm advisors from each geographical region of the state and Don Watson of the Diamond Walnut Growers, and Harold Forde, Pomology Department, and Extension Specialists Gordon Rowe and Dave Ramos to address ourselves to this problem.

Our deliberations at that meeting led us to two conclusions. One was that there was not adequate information available from records to develop any meaningful factual yield expectation curves. The other conclusion was that in all probability there is more variation between orchards of a single variety, as the result of different management practices, than there is between varieties within certain groups. The three groups proposed were as follows:

Group I	80% or more lateral pistillate flowering
Group II	50-80% lateral pistillate flowering
Group III	Less than 50% lateral pistillate flowering

It was proposed that we determine if we could make some generalized statements concerning each group in terms of its expected precocity and yield expectations which would stand the wear and tear of time and criticism.

The steering committee met again on December 7, 1973, to see if we could attempt to make some preliminary statements and yield expectations which we could present to the Walnut Farm Advisors' Conference in January, 1974 for their criticisms and suggestions. In order to temper our estimates with fact, we requested farm advisors in walnut producing counties to send us copies of all yield records they had accumulated by variety and age, and also provide suggestions and criticisms of this concept to guide our thinking.

At the conclusion of the December 7th meeting it was the consensus of the group that not enough factual information was available to substantiate any estimates the group could project.

Other problems considered by the group which added to its ultimate frustration were those associated with differences in tree density per acre,

and the fact that with advancing age at least some varieties within a group, such as Hartley, produce crops in excess of some varieties in groups with a greater percentage of lateral pistillate flowering.

Walnut Breeding - H. I. Forde

One hundred forty-six seedling progenies (1971 numbers) were grafted into the test orchard. Three 1967 numbers were grafted into the selection block. Five new crosses were made from which we harvested 446 seeds.

Field notes and nut samples were gathered from trees in test orchards at Davis.

Nut samples were also gathered from the variety and selection block at Davis, and from test plots in various counties. These samples were graded by Diamond Walnut Growers. Results will be published in the February, 1973 Diamond Walnut News.

Walnut Variety Evaluations - G. S. Sibbett

Eight walnut varieties were evaluated for kernel yield and quality in Tulare county. Serr was superior in kernel yield, quality and value to UC 59-124, UC 61-25, Vina, Chico, Ashley, Payne, or Tehama respectively.

Walnut Varieties - W. Schreader, H. Forde, W. Moller

A sample of a budsport of Hartley and a comparable Hartley sample were the only ones submitted for crackout evaluation this year. The sport originated in the Lloyd Barton orchard in Ripon and a patent is now applied for. It differs from Hartley in that it has a higher kernel content, is earlier in blooming and maturity, and bears heavy crops sooner due to a high percentage of fruitful lateral buds.

Inoculations of the causal agent of phloem bark canker did not produce the disease in either the Hartley trees or the budsport. It is believed the trees may be too young for the disease to occur.

A trial planting established in Lockeford in 1971 was continued. The varieties are 61-12, 61-25, 64-172, Scharsch Franquette, and Waterloo. The objective is to evaluate late blooming varieties for cold riverbottom areas.

Walnut Varieties - L. C. Hendricks

Observations have continued on varieties from commercial orchards and from the Ed Hector plot which was established in 1968 by Dave Ramos. During 1973 the Serr variety continued to have excellent quality in most locations but the crops are only moderate. The selection UC 59-124 also has excellent quality and high kernel yield. The production on this variety seems to be somewhat better than Serr. The new selection of the shells were perforated.

Observations of these varieties will continue, but some of the less desirable varieties at the Hector plot will probably be grafted to Ashley during March 1974.

Pecan Evaluation - G. S. Sibbett, K. Hench

Thirteen pecan varieties have been planted or budded since 1971 into a two acre plot to evaluate growth, yield, quality, nutrition, and pest and disease problems. In the third year of growth, the Wichita variety produced approximately one pound of nuts per tree demonstrating an ability to be heavily fruitful during early years. Barton, the same age, was not productive, showed generally low vigor and expressed zinc deficiency symptoms throughout the growing season regardless of treatment to maintain zinc status in all varieties. Choctaw was not as productive as Wichita but showed excellent vigor and fruit wood development for the next season. All other varieties were two years old and younger and were unproductive. No other special problems were noted on any of the varieties included into the plot.

S O I L - W A T E R - P L A N T R E L A T I O N S

Rootstocks

No Blackline Observed in Tulare County - R. R. Sanborn, G. S. Sibbett, W. J. Moller

"Blackline" continues to appear as a serious factor affecting longterm walnut orchard productivity in the northern San Joaquin Valley and San Francisco Bay area counties, and concern has been expressed about its possible occurrence in other major walnut-producing areas.

During October 1973, a survey for "blackline" symptoms was conducted in 15 separate locations in Tulare county. Almost 50 mature walnut trees, growing on both black walnut and paradox rootstocks, were examined in detail. Trees selected were generally older trees, showing evidence of decline, and suckering from below the graft union. In selecting sample trees, it was considered by these observers that if the trees had been in the central California walnut counties they would have readily exhibited the definitive "blackline" symptoms at the graft union. However, not one single tree showed this symptom, thus on the basis of this limited survey, there is no evidence at this time to suggest that "blackline" occurs in Tulare county.

Propagation of J. regia - G. C. Martin, D. E. Ramos

Seedlings of Eureka grown from seed supplied by walnut farm advisors in 1972 were top worked with Vina, Chico, Ashley, Serr and Payne by Mr. W. Stuke in the spring of 1973. Further handling of these grafted trees was under Mr. Stuke's direction. He found the grafting to be easily accomplished and lost only one tree. At the time of leaf abscission in the fall of 1973, the trees were in excess of 10 feet in height. The results of this study indicated that J. regia rootstocks are easily grafted and will grow rapidly in the nursery. These grafted trees are being prepared for field testing at three locations.

Rootstock Plot - Crows Landing - L. C. Hendricks

The rootstock plot in Crows Landing is a comparison of Northern California Black, Hybrid, and Eureka seedling rootstocks. These trees were planted in 1972 and were grafted in place to Ashley. In January, 1974 the hybrid trees have made excellent growth and are comparable to nursery grafted hybrid trees after the second year of growth. The Eureka seedling trees have made satisfactory growth and most are approximately equal to nursery grafted trees

following first year, or somewhat better. The Black walnut trees have had difficulties in this preplant situation and in general are small. Many have been lost from excess water which seems to be a problem in this one acre plot. Many are equal to the Eureka seedlings but on the average they are smaller. A summary of the January, 1974 rootstock measurements follow:

Rootstock	N	Circum cm	Diam. cm	Area cm^2
Hybrid	43	20.1	6.4	32.2
Eureka Seedling	38	14.8	4.7	17.4
No. Calif. Black	80	12.4	3.9	12.2

Manregian Seedlings - W. Schreader, G. C. Martin

Ten pounds of Manregian seeds originating at the Webster Nursery in Oregon were planted by Stuarts' Nursery in French Camp in 1972. The seeds were from selected sources in Oregon and are supposed to produce more uniform and vigorous trees than Eureka. Growth in the nursery appears to be comparable to or better than that expected from Eureka. These trees will be dug in January, 1974 and are available for planting trials statewide.

Sensitivity of Walnut Rootstocks to Waterlogging - P. B. Catlin, G. C. Martin

The sensitivity to waterlogging of seedlings of J. hindsii, J. regia and P. stenoptera (Chinese wingnut) was measured by a procedure whereby water level and root temperature could be precisely controlled. At root temperatures of 33°C, J. hindsii and J. regia seedlings were highly sensitive to waterlogging whereas seedlings of P. stenoptera were very tolerant. Symptoms were delayed by supplying O_2 to roots of J. hindsii during waterlogging. At 23°C, J. regia seedlings were slower to succumb than at 33°C and one has been selected as being tolerant. Valid comparison of J. hindsii and J. regia at 23°C has not yet been obtained. Sensitivity was affected by the shoots' environment in addition to the effects of temperature and O_2 deficiency on the roots. Phenomena possibly responsible for or contributing to sensitivity to waterlogging will be discussed.

Comparison of J. hindsii and J. regia vs. Pratylenchus vulnus - B. F. Lownsbery, G. C. Martin, E. H. Moody

After two seasons' growth in a Winters orchard infested with Pratylenchus vulnus, the mean trunk diameter for seven J. regia seedlings (14 ± 3 mm) was not significantly larger than that for seven J. hindsii seedlings (12 ± 1 mm). Neither did they differ in lesion formation, which was considerable on roots of both species.

Phytophthora Collar and Root Rot of Walnut Trees - J. Mircetich, W. J. Moller, W. R. Schreader

Surveys of commercial walnut orchards with dead or dying trees in San Joaquin county revealed that Phytophthora spp. were associated with diseased trees.

Phytophthora cactorum was recovered from walnut trees showing collar and trunk canker.

Phytophthora cinnamomi was recovered from decayed roots and soil around diseased trees from one commercial orchard with a large number of dead or dying trees. Walnut trees from which this pathogen was recovered showed stunted growth and small chlorotic leaves, plus decayed feeder and large secondary roots. A large number of trees with severe root rot collapsed by mid-summer.

An unidentified Phytophthora spp. was isolated from walnut trees in several commercial orchards in which a large number of trees showed poor growth, small chlorotic leaves and dieback of terminal growth. The trees from which this unidentified Phytophthora spp. was isolated, in contrast to those trees infected with P. cinnamomi, showed a restricted root rot which was usually limited to the feeder and smaller secondary roots.

A survey on Phytophthora spp. associated with diseased walnut trees will continue in 1974. Experiments for evaluation of virulence of various Phytophthora spp. to different walnut rootstocks are in progress.

Production of Clonal Walnut Rootstocks from Rooted Cuttings - H. T. Hartmann

It is known that both softwood and hardwood walnut cuttings can be rooted. The problem is in obtaining survival. To develop commercially feasible production techniques, work with both types of cuttings should be done. In rooting leafy cuttings under mist, treatments should be made to maintain growth once the cuttings are rooted. These would include such treatments as: use of nutrient mist, pre-girdling cutting material, treatment of

buds with gibberellin and/or cytokinin, use of fog rather than mist, use of 24-hr. high intensity light during rooting, use of auxin-fungicide combinations, use of high bottom heat, and trials with various solid block rooting media.

In tests with hardwood cuttings, determinations should be made of such factors on rooting and survival as: influence of time of taking cuttings, effect of wounding, effect of pre-girdling cutting material, and use of auxin-fungicide combinations.

S O I L - W A T E R - P L A N T R E L A T I O N S (Cont.)

Nematodes and Soil Fumigation

Nematode Research with Walnuts in 1973 - B. F. Lownsbery, E. H. Moody

Two preplanting soil fumigation treatments were used before replanting walnuts in an old walnut orchard and vineyard in sandy soil south of Manteca. The soil was infested with Criconemoides xenoplax and Pratylenchus vulnus. The two treatments were 1) Shell DD(R) - 50 gallons per acre injected at a 12-inch depth, and 2) Shell DD - 250 gallons per acre with 200 gallons injected at a 24-inch depth and 50 gallons at a 12-inch depth. Untreated border sites were used as controls. Mean trunk diameters in mm for 29 trees after three seasons' growth in each of these treatments were 34 ± 3 for trees at untreated sites, 41 ± 3 for trees at sites treated with Shell DD - 50 gallons per acre, and 66 ± 3 for trees at sites treated with the 250 gallon rate.

Nematodes - W. Schreader, D. Johnson

A pre-plant treatment using a backhoe and fumigants at various rates (as shown below) was established in the Lloyd Barton orchard in Ripon in 1971. The trees are interplanted in a mature Hartley orchard in a randomized complete block design with ten replications per treatment. The results are as follows:

Treatment per Site	Mean Cross Section cm^2	Relative to Check
MC-2, 1#	101.20	2.06
MC-2, 2#	152.80	3.12
MC-33, 1-1/2#	99.40	2.03
Telone (R), 1 qt.	159.50	3.25
Telone (R), 2 qts.	116.00	2.37
Telone C(R), 1 qt.	115.00	2.35
Check - No fumigant	76.21	1.55
Check - No backhoe or Fumigant	49.02	1.00

These treatments have not been subjected to analysis of variance yet. The results do look good, however, because of the large differences between means of some treatments and fairly uniform consistency between trees within treatments.

Preplant Fumigation and Growth of Walnut Intersets - G. S. Sibbett, D. E. Johnson

Trunk caliper of interset Serr/Black walnut trees was not increased significantly in any one of three years following planting by prefumigating tree sites with either of several materials. The experiment was conducted in an established Franquette walnut orchard that was competitive for light, water, and nutrients with the young trees also influencing tree growth.

Walnut Preplant Fumigation - L. C. Hendricks

Observations and measurements are continuing on three walnut preplant fumigated plots in Merced county and one in Stanislaus county. The 1973 measurements are being taken at this time. An additional experiment has been established at Modesto, in Modesto loam soil which is fairly typical for this area. The treatments following backhoeing are .5, 1, and 1.5 pints of Telone per hole and .5, 1, and 1.5 pounds of methyl bromide (MC-2) per tree hole. In this experiment there are 14 replications. These were applied in August of 1973. These trees will be planted in February or March of 1974.

Cover Crops and Nematodes in Walnuts - D. E. Johnson, G. S. Sibbett, L. C. Brown

Two trials were established in the San Joaquin Valley in 1972 to determine the effect of various cover crop regimes on nematode populations under walnuts. In one of the trials (Tulare county), root knot nematode (*Meloidogyne* sp.) was found in high numbers associated with two cover crop regimes, while the cultivated area contained relatively few of these nematodes. Lesion nematode (*Pratylenchus* sp.) numbers were low regardless of treatment. In the second trial (Kings county), lesion nematode populations were about equal (high) in both the legume and grass/weed cover.

The effect of cover crops as nematode nurseries on the growth and production of walnuts remains to be evaluated.

Irrigation

Drip Irrigation - W. Schreader, F. Aljibury

An observation trial was established in an old orchard on 30 trees between 35 and 40 years old. The soil was mapped as Wyman clay loam, the most common soil type planted to walnuts in the county. A major problem occurred which may prevent the use of drip irrigation on soils of this nature planted to a crop dependent upon mechanical harvesting from the soil surface such as walnuts. As the season progressed and the soil became progressively drier in the areas not wetted by emitters, the soil cracked severely. The cracks became so large as fall approached that many nuts could fall into them and become lost during harvest. This problem was of such concern to the grower that he sprinkled the soil in the trial area during his last irrigation so he could work it down for harvest and eliminate the cracks.

No differences in tree growth were observable in the trial compared to the check trees. The soil did have a basic intake rate less than the water application rate of one gallon per hour per emitter. This saturation problem was easily overcome by sequential operation of the system.

Observation of soil moisture conditions were made to depths of one, two, and three feet with tensiometers replicated at three locations. In general the areas wetted by the emitters were kept in a range somewhat above field capacity throughout the season. The soil in the sprinkler irrigated areas was saturated for periods of several days at each irrigation.

Holes were dug in the trial and check areas to observe root growth. No effort was made to develop statistically reliable measurements. It was estimated that by mid August, just prior to the last irrigation, there were three or four times as many active feeder roots in the emitter-wetted zone compared to the regularly sprinkled area. No sign of recent root rot or dead roots was observable in the drip area, but recent evidence of dead roots and root rot was commonly observed in the sprinkled area.

SHOOT AND FRUIT GROWTH

Chemical Sprout Inhibition on Walnut Nursery Stock - G. S. Sibbett, M. Bailey

Black walnut rootstock sprouts on just grafted nursery trees were significantly reduced throughout the season by trunk spray applications of either 1% or .5% emulsifiable or water soluble solutions of NAA applied in March when sprouts were one inch long. Differences in sprout growth between treated and check trees remained significant at the 1% level while "suckering" was continued in check trees throughout the season. Root growth, observed between treated and check trees at digging, was not affected by treatment.

Sunburn Protection and Insect Damaged Walnut Kernels - G. S. Sibbett, C. S. Davis

In a replicated experiment insect damaged Payne walnut kernels were reduced significantly with June applications of Sungard when compared with no treatment. No significant differences occurred, however, in kernel quality or networth per inshell pound of walnuts. There were no apparent visual difference in sunburned nuts whether trees were whitewashed or not.

TREE GROWTH AND MANAGEMENT

Pruning

Influence of Hedging on Production and Quality of Mature Payne Walnut Trees - G. S. Sibbett, D. E. Ramos

In the first year, dry tonnage in a heavily canopied 13-year-old Payne walnut orchard was significantly reduced by mechanized pruning (hedging) when compared with either no pruning or hand pruning. In the second year, yield from plots hedged did not differ significantly from those hand or non pruned. No significant difference in walnut quality existed either year of the test. Information is needed on the effects of light and shoot vigor on lateral bud fruitfulness and the influence of hedging in modifying these conditions.

Mechanical Pruning - W. Schreader, D. Ramos

The ten observation plots of mechanically hedged older trees treated in November 1971 for a rejuvenation effect were observed again in 1973. No further treatments were made on these trees due to the excessively wet winter of 1972-73. (See 1973 Abstracts of Reports from Farm Advisors' Conference for description of pruning treatments.)

Anderson-Barngrover Orchards

Plot 1 - The trees grew somewhat less in 1973 averaging 12-18 inches of growth mostly in areas associated with previous pruning cuts.

Plot 2 - Continued rejuvenation of growth occurred on most severely cut trees. The grower mechanically pruned the remainder of this block, about 50 acres, in the fall of 1973.

Farmington Land Co. (The grower sold this property in three parcels this year which divided the treated area up.)

Plot 3 - Excellent tree vigor was observed in this orchard this year. An unusual, and unexplained, death of wood of the previous year's growth occurred this spring on some trees in this orchard. No nutritional disturbance could be determined by Dr. Kay Uriu, nor were any plant pathogens found by Dr. Bill Moller. This problem will receive attention again in the spring of 1974. No comparable problem was observable in any of the other plots located outside of this property.

Plot 4 - Excessive regrowth continued to be the general pattern in this plot indicating we should have either cut more lightly or on only two sides of the trees rather than on four.

Plot 5 - Trees are still growing excessively with three or more feet not uncommon.

Bill Hosie Orchard

Plots 6, 7, and 8 - Very little response or regrowth even in most heavily pruned trees.

Bob Prouty Orchard (Property sold and trees to be removed in 1974.)

Plots 9 and 10 - Same as 1972

No effort was made to secure the yield per tree or the grade of nuts in these treatments. The experience from these observations is expected to be of use in establishing replicated experiments in the future.

TREE GROWTH AND MANAGEMENT

Insects

Walnut Insect Survey - L. C. Brown, C. S. Davis

Weekly leaf samples consisting of 100 leaves each were obtained from three cultivated and three non-cultivated walnut orchards. The purpose of this survey during the summer months was to determine the kinds of insects present in the walnut orchards and the population levels.

Samples were collected and sent to Berkeley for insect identification and numbers. Insects accounted for in the survey included the following: thrips, scale crawlers, walnut aphid, predator mites and two-spot mite.

At the beginning of the season leaf samples were collected from the ground. Starting on July 9, additional leaf samples were collected which could not be reached from the ground. These samples were obtained by cutting leaves off 10-12 feet from the ground.

The two insects which were of primary concern were the walnut aphid, Chromaphis juglandicola, and the two spot mite, Tetranychus urticae. There appeared to be a trend in populations of the two spot mite toward higher numbers in the non-cultivated orchards. There was considerable variation in numbers of mites between samples obtained from the top and the bottom of the trees.

The walnut aphid populations appeared to be consistently higher throughout most of the summer in the non-cultivated orchards as compared with the cultivated orchards. There was considerable variation in numbers of aphids from samples obtained from the top and from the bottom of the trees. The numbers of aphids were normally higher in the tops as compared with the numbers of aphids on leaves which could be reached from ground level.

Frosted scale crawlers were present in all six orchards. The counts were reduced to zero in the orchards after July 16, probably due to their vulnerability to high summer temperatures.

Thrips populations were consistently higher in cultivated orchards than in non-cultivated walnut orchards. Their numbers decreased after June. There was some build up of thrip again in July and August in the cultivated orchards.

Predaceous mites were low in all orchards from May through July.