MANAGEMENT SYSTEMS FOR HIGH DENSITY WALNUT ORCHARDS


ABSTRACT

Chico walnut trees planted in 1974 in hedgerows (22' x 11') trained into a fruiting wall and mechanically pruned since 1978 continue to yield significantly greater crop than standard spaced and pruned trees. In 1984 the yields were as follows: hedged one side = 3,578 lbs. per acre, hedged two sides = 3,465 lbs. per acre, and conventional spaced (22' x 22'), hand pruned = 2,522 lbs. per acre. Thus, the hedgerow trees produced about 1/3 more crop than the check even though overall production was down compared to 1983. A third hedging treatment, in which the trees were hedged on two sides each year until 1981, left unpruned in 1982 and 1983, and then rehedged on two sides in 1984, yielded only 2,682 lbs. per acre. This represented a drop in production of more than 50% from the previous two years and indicates that even though yield can be increased for at least two years by allowing the trees to go unpruned, there is a substantial crop reduction in the year when hedging is resumed. As in previous years, mechanical pruning of the hedgerowed trees was performed with a vertical boom hedging machine positioned to cut about 4 feet from the trunk. However, no tree topping was performed in 1984 in contrast to previous years. A preliminary study of the effects of summer pruning in hedgerow plantings conducted in a commercial size Chico hedgerow trial in its third leaf suggests that it might be a desirable practice, possibly in combination with dormant hedging to maintain desired vigor and cropping under very vigorous growing conditions. Variety trials to measure the performance of various walnut cultivars in a high density hedgerow management system have been established in Tulare, Merced and Yolo counties.

OBJECTIVE

To develop more efficient high density management systems for early production and sustained high yield of walnuts, examine pruning systems and how they influence tree physiology and productivity, and determine adaptability of various walnut cultivars and proper tree spacing for hedgerow plantings.

PROCEDURE

The 'Chico' hedgerow trial (22' x 11') established in 1974 near Vina was maintained and the two hedging treatments initiated in 1978 (one side hedged vs. two sides hedged each year) were continued in 1984. Yield data also was obtained from a third hedging procedure in which the trees were left unpruned for two consecutive years. Production was compared with standard-spaced (22' x 22'), hand-pruned trees.

A commercial size (40 acres) hedgerow trial involving Chico with Ashley pollenizers at a 22' x 11' spacing is being developed near
Visalia in cooperation with Farm Advisor Steve Sibbett. It has now gone through its third growing season, and training to this point has been strictly by hand. However, the trees have grown very vigorously and appear to be ready for mechanical hedging and topping.

Variety trials designed to measure the performance of various walnut cultivars under a high density hedgerow management system are being developed in Tulare, Merced and Yolo Counties in cooperation with Farm Advisors Sibbett, Hendricks and Reil, respectively. The Visalia trial (20' x 10') was planted in 1982 and grafted in 1983 to 15 cultivars in three replications of nine trees per plot. The trial near Gustine was planted in 1983 and consists of 12 acres at a 30' x 15' spacing comparing five cultivars -- Payne, Chico, Vina, Chandler and Howard. The Winters trial includes five cultivars (Chico, Vina, Chandler, Howard and Amigo) at two difference spacings (22' x 11' and 18' x 9'). The 350 trees in this trial were planted as Black walnut seedlings in 1983 and allowed to grow one year before grafting in the spring of 1984.

RESULTS AND CONCLUSIONS

Yields obtained from the Vina hedgerow trial in 1984 were down by about one-third compared to 1983. Individual treatment yields were as follows: hedged one side = 3,578 pounds per acre, hedged two sides = 3,465 pounds per acre, conventional-spaced hand-pruned = 2,522 pounds per acre. The data show that the original hedgerow pruning procedures (hedging either one or two sides each year) are similar and still producing significantly greater crop than the standard spaced and pruned trees. It is not clear why the yields for the entire trial fell in 1984. One possible explanation is that the severe hedging performed on the more vigorous Gustine pollinizer trees in the plot may be causing sparse catkin production on these trees resulting in inadequate pollination of the early Chico pistillate bloom which is solely dependent on the Gustines for fruit set. This possibility will be investigated in the spring of 1985. It should be emphasized, however, that the hedgerowed trees yielded about 40% more crop than the check trees in 1984 in spite of the overall seasonal crop reduction. A third hedging treatment started in 1982 in which the trees were unhedged for two consecutive years and then hedged on both sides in 1984 yielded only 2,682 pounds per acre. This represented a drop in production of more than 50% from the previous two years when these trees produced significantly more crop than hedgerowed trees that have been pruned each year. The conclusion is that even though yield can be increased for several years by allowing the trees to go unpruned, there is a substantial crop reduction associated with the year in which the hedging procedure is reinstituted. This potential loss of crop was noted in April, 1984, when it was observed that the trees left unhedged for two consecutive years and then hedged on both sides looked more sparse in the lower portion of the canopy with much less growth and more dead wood and what appeared to be less crop as compared with the trees hedged every year. The reduction in growth and increased dead wood observed in the lower canopy also suggests that this loss of production might persist for more than one season and even raises the questions of whether it can be completely recovered. This will
become more clear as we continue to collect yield data over the next several years and analyze data on nut density and size and light penetration associated with different locations in the lower canopy of the different hedging treatments.

A study of summer pruning in hedgerow plantings was conducted in the commercial size 'Chico' hedgerow trial near Visalia. This limited trial with vigorous third-leaf trees indicated that this might be a desirable practice perhaps in combination with dormant hedging to maintain the desired degree of vigor and cropping, in very vigorous growing situations. Summer-pruned trees were smaller than those not pruned, showing the dwarfing effect of summer pruning. Even though individual shoot growth was less, the summer pruning induced additional branching near the point of cutting causing the trees to be somewhat more dense than those that were not summer-pruned. This might be an advantage in getting the trees at this early age to come into bearing somewhat sooner. Plans are to collect yield data from this trial next year and to begin evaluating the effects of summer pruning in combination with dormant hedging in a hedgerow management system.

Observations made in the hedgerow variety trial near Winters where the trees were field-grafted after one year suggest that it may be desirable to whip-graft the trees at about 2-1/2 to 3 feet above ground and to align the scion so that the two buds are parallel with the row. By doing so, it would seem possible to create a parallel "V" training system in which two primaries are formed the first year after grafting and headed at the end of that growing season to insure strong secondary branch development the next year. This might allow growers interested in hedgerow planting to utilize less expensive Black walnut seedlings and field grafting rather than the more expensive nursery-budded trees while not losing an additional year of growth in developing the trunk and primary scaffolds.