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Do Windbreaks Pay?

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H. H. Gardner: I had occasion last evening at a Farm Center meeting to make a report to the Board of Directors and in that report I reported that Harold Wahlberg rose to announce that his production cost studies regarding avocados were ready and, as usual, he run in a talk on windbreaks. Mr. Wahlberg is an enthusiast on the subject of windbreaks. He has certainly made a thorough study of the question and will make it worth your while to listen to him.

H. E. Wahlberg: Mr. Chairman, and Members of the Institute: The recent heavy wind of October 22 again reminded us of the need of windbreak protection in the wind exposed areas of Southern California. Heavy losses have been sustained by hundreds of growers who had not provided protection against these almost regular wind storm onslaughts. Scores of orchards have lost not only a large portion of their fruit crop for the 1936 season, but the fruit remaining on the tree is badly scarred and trees have been defoliated and badly whipped so as to weaken them for several seasons to come.

The need for more extensive protection in the orchard was never more keenly felt in many parts of Southern California, nor has the windbreak ever been more keenly appreciated by those who benefited by them in the recent storm. Many fine examples of efficient protection may be seen in the areas where the older windbreaks have been established. One need only to visit a few protected orchards to be convinced of the value of windbreaks, by comparing the very noticeable smaller loss of fruit and tree damage in the protected orchards against the heavy amount of windfalls, tree damage and scarred fruit in the unprotected orchards.

Following every season of heavy winds the contrast between protected and unprotected fruit is readily discernible in the packing house, even to the untrained eye. The scarred fruit shows up like a sore thumb. It is not only unsatisfactory to the grower but also disconcerting to the packing house manager, who desires to get the maximum grades and returns for the grower. His efforts are almost blasted, however, when he is forced to divert a large portion to the cull bin or at best to orchard run pack because of wind damage. Lower grades after the wind storm of 1932 did create some concern and anxiety among both growers and packers. They realized at the time the basic cause of the trouble and a few took steps to correct it by planting windbreaks. In fact, a survey of sales of windbreak seedlings in Orange County, made by the Agricultural Extension Service, revealed the planting of 45,000 seedlings, mostly Eucalyptus, during the year. This is sufficient material to provide about 45 miles of windbreak protection. But that is

only a drop in the bucket. There is room and need for ten times, yes, twice and thrice ten times that amount of protection in the citrus areas of Southern California to obtain effective orchard protection and community benefit.

WINDBREAK SURVEY

While watching various lots of fruit go over the sorting belts following the storm, we conceived a plan of evaluating windbreaks or windbreak protection. Several sets of orchards for comparison were selected. Each set was composed of two orchards of similar age, soil, and orchard treatment as near as possible, with the only variable factor being the presence of a windbreak in one and the absence in the other. Thirteen sets totaling twenty-six orchards were compared in three orange packing houses located in typical wind frequented districts of the citrus area. Through the cooperation of the packing house officials, we secured the season's grades and returns for orchards selected in the comparative sets.

To briefly summarize the comparison of quality of fruit and returns from the selected orchards in the three houses, let's set up side by side the protected and unprotected orchards. That will give us a clearer picture of the economic value or dollar and cents value of the windbreak.

	Windbreak	No Windbreak
Number of Orchards	13	13
Average Percent Fancy	7.22	1.25
Average Percent Sunkist	74.08	59.26
Average Percent Redball	18.70	39.49
Average Field Boxes per acre	455	371
Average Packed Boxes per acre	268	202
Average Total Returns per acre	$229.64	$137.68

The packing house records produced here definitely show that windbreak protection is a tangible asset to the orchard. Not only is the quality of fruit protected during the wind storms but the quantity of fruit is also preserved. Note that the protected orchards picked 455 field boxes per acre, while the unprotected orchard averaged 371 field boxes. The protected orchards packed out 268 boxes per acre and the unprotected orchards 202 boxes per acre.

RETURNS CONVINCING

Let's study the returns reported for the two sets of orchards. They provide much food for thought. They speak louder than any other argument that might be submitted. They should be convincing, but in spite of the large accumulation of evidence in favor of the windbreak, secured this year and in years past, there will be hundreds of acres of citrus that will continue to suffer the heavy blasts of desert winds from year to year, and growers will continue to complain about their low grades and many will continue to offer arguments why windbreaks are competitive, take up too much ground, cut down

production and ad infinitum.

Nevertheless, here are the facts. In 1933, a year of comparatively low prices and quality fruit, the windbreak protected orchards returned $90.00 more per acre than did the unprotected orchards. The average total returns on the former were $229.64 per acre and on the latter $137.68 per acre. The difference of $90.00 an acre is equivalent to an earning of 6 percent on a capitalization of $1500 per acre. In other words, the acreage under efficient windbreak protection that year was worth $1500 an acre more than similarly located orchards without protection.

If 1935 prices were substituted for the 1932 prices, the difference in returns between the protected and the unprotected orchards would have been $142.00 per acre.

More factual evidence was collected this month to show the economic losses suffered directly by the growers and indirectly by the community at large as a result of the last heavy winds.

LOST $30,000 CROP

One grower of 100 acres of Valencias took me through his orchard recently to see the effects of the wind and make plans for systematic windbreak protection. He explained that before the wind his packing house estimated a crop of 40,000 boxes. A week after the wind a generous estimate was made of 12,000 boxes left on the trees in the more protected portions of the orchard. Consider the lower grades of that remaining fruit. Consider the shock on the trees that will be reflected on their growth and production for the next four years or more. Consider the monetary loss this year, and the next, and the next. A potential return of $40,000 on this orchard has been blown down to a maximum of $10,000 because of no wind protection. A loss of $300 per acre. What is a windbreak worth in his case?

One of the packing houses in the eastern part of the county furnished me these figures to present at its annual meeting. Estimated production before the wind 800 cars of fruit, after the wind 500 cars. This represents a loss to the members of the house of 250 cars. This is equivalent to 175,000 field boxes. Anticipating a dollar per field box this year for average Valencias, the windfall loss in this one house equals $175,000. Add to this a conservative depreciation in grades of $25,000 for the house output this season. Thus a total loss of $200,000 spread over some 2,000 acres served by that house makes an average loss of $100 per acre.

What would you do if a band of thieves came into your orchard and stole $100 worth of fruit from each acre this year, and maybe next year, and likely every second or third year? Yes, so would I, but neither the sheriff nor all the jails in California are equipped to plant your windbreaks that will materially reduce this seasonal loss. That is in your own hands. Orchard enemy No. 1 can be controlled. For those of you who are located in wind exposed areas it will pay to make room for a windbreak. Take out a row or two of trees if necessary to make room for it. Records indicate that in those locations it is economy to devote 10 per cent of the property to windbreak protection.

PLANTING SUGGESTIONS

The spring months are the best season to plant windbreak seedlings. The earlier plantings usually have the advantage of allowing the young seedlings to become well rooted and established before the hot weather starts. The most effective, as well as most popular variety for citrus orchard protection is the blue gum or Eucalyptus globulus. It is favored because of its rapid growth to develop the greatest height in the shortest time; it is comparatively free of disease and insect pests; it is easy and cheap to propagate. If the blue gum is used alone without an alternate filler, the trees may be planted four to five feet apart in the row and after three or four years' growth, every other tree headed back within a foot of the ground to produce a suckering and branching in the lower part of the break, thus providing a more solid wall of protection.

What now appears to be a better arrangement of planting, however, may be secured by using the new bushy variety of blue gum known as Eucalyptus globulus compacta for the filler between the standard upright blue gum trees. The compacta, as the name implies, gives a thick, low-branching effect for lower protection. This variety comes as a new development in windbreak technique to displace the once popular Monterey Cypress that has too often succumbed to the ravages of both fungus and insect infestations. The compacta is now generally available and can be secured from most nurserymen by placing orders several weeks ahead of planting time.

The Arizona Cypress is becoming more popular as a filler in combination with the blue gum, but it is also, though to a less degree, susceptible to both the cypress bark beetle and coryneum fungus which have caused the wholesale destruction of the Monterey Cypress in the coastal districts.

The Forbes cypress, a native species indigenous to Orange County, is making a good record for itself in the rate of growth and freedom from pests. The limited plantings that have been made and observed in the botanical gardens of Rancho Santa Ana indicate that it may develop into a desirable tree for windbreak purposes—that is, as a filler to replace or substitute for the Monterey Cypress.

The usual distance for planting the tall blue gum in the row varies from eight feet in the sandy soils to ten or twelve feet apart in the deep loam soils. The fillers are set in the middle of this space, thus making the spacing four to six feet between trees in the alternating planting.

Healthy, vigorous seedlings not over five inches high in the flat, should be selected for planting. Older or larger seedlings often develop ill-shaped roots when they reach the bottom of the nursery flat which does not encourage a well formed root system when the trees mature in the field planting. A bunched root system does not give sufficient anchorage or brace roots for the tall trees to withstand heavy wind pressure. It is therefore necessary to start with well formed normal rooted seedlings if a strong well directed root growth is to be obtained.

PLENTY OF ROOM

The windbreak row should be given ample room for development. Often times it is cramped into a narrow space either on or so close to the property line that no room is available for necessary root cutting operations in later years. The windbreak row should be given as much right-of-way or even more than any fruit tree row in the orchard. Do not plant too close to the neighbor's line. There should be ample space between the property line and windbreak to allow room for good root development and root anchorage after the root cutting operation on the line. Where heavy wind losses occur the removal of a row of trees is well justified to make way for the windbreak line.

In the more exposed wind districts one can justify devoting ten per cent of the orchard area to windbreak protection—one acre out of every ten. Heavy losses will be borne by many districts every time the wind blows until such time that these communities become windbreak conscious. A community project with a windbreak on every ten acres will be the most practical solution to maintaining an economic and permanent citrus or avocado industry in those districts that are periodically wind beaten and experience serious financial losses therefrom.

CAREFUL MANAGEMENT

After planting, a windbreak should not be left to itself and neglected. It requires attention and responds to good care just as any orchard tree. Root competition with the adjacent first row or two can be materially minimized by regular irrigation, fertilization and periodical root cutting. Rapid growing Eucalyptus breaks require an ample supply of moisture and fertility. They should not be overlooked when applications are made to the orchard trees. In fact, it is good practice to give the two rows next to the windbreak a more generous allowance of fertilizer materials, particularly the bulky organic materials, than the average application in the balance of the orchard.

An earlier application of water may be required in the spring along the windbreak row. One can be guided by the use of the soil auger or spade.

The spread and competition of the windbreak roots may be controlled satisfactorily by periodical cutting with special subsoil root cutters made for that purpose, or by digging a trench. In the latter method, the trench should be refilled and not allowed to remain open. In the first place, open trenches are dangerous, and secondly, the roots will find their way under the trench in time.

Finally, the windbreak is an asset to the orchard in those districts frequented by strong winds. The foregoing data show that the protection given by windbreaks increases the returns to the grower and therefore the actual value of the land under its influence. The windbreak will respond to good care and management and will many times pay for its keep. Windbreak protection in many areas is essential to satisfactory production and returns. The recent storm should encourage extensive windbreak plantings this season, and kindle greater wind consciousness in many communities. A windbreak on every ten acres should be the goal in some districts, and not till that goal is reached will the problem of low grades in windy seasons be solved.

Mr. Pickering, Mr. Marshburn and I took a trip around the avocado orchards following the recent windstorm. I want Mr. Marshburn to tell you what we saw that day. Mr. Austin

Marshburn is past president of the Orange County Avocado Growers Department.

A. R. Marshburn: I was on the other end of the telephone a week or so ago and Mr. Wahlberg asked me to say something about the value of windbreaks. Of course I tried to get out of it but being a good friend I felt I had to do it after all.

As to the wind of 1933—people from Los Angeles County kept coming to look over the damage; then shake their heads and go on back, remarking "pretty bad, pretty bad." But on March 10, two months later, we took a look at the earthquake area where we saw the bricks in the streets, fireplaces and front walls demolished and other ruin, so we shook our heads and went back to Yorba Linda feeling it wasn't such a bad place after all.

MARSHBURN'S OBSERVATIONS

The wind does do much damage—there is no question about it. Following the 1933 wind, I went to see the row of gum trees on the east side of an avocado grove which were planted at the time the owner planted his avocado trees. Looking over his grove, you couldn't tell that the wind had been across that country until you went on the west side. However, with this last wind, his avocado trees had grown but his gum trees hadn't grown so rapidly in proportion and there was some damage. I went back home and planted a row of windbreak trees. They grew nicely and we had very little wind damage. Two years of good weather, but last year we had it with a vengeance. The east side of our grove was very well protected.

Mr. Wahlberg: Mr. Pickering, will you give us two or three minutes on your observations? Mr. Pickering has a very fine windbreak on the east side of his orchard.

A. C. Pickering: The other night I happened to be home when Mr. Wahlberg phoned me, or perhaps I wouldn't have to be here now. My observations of the benefits of a windbreak are few, but I have had a great deal of protection on my own place and in handling the bulk of the fruit that is leaving the Yorba Linda tract I had observed a young grove where the crop was estimated at two to three tons before the wind. I have since the wind marketed all the fruit from that grove which was only a half a ton. That fruit was badly damaged and graded out about 10 per cent first class fruit. The rest of it was scarred and graded culls. The trees were badly damaged so that the next crop will be very poor.

10% DAMAGE INSTEAD OF 90%

On the other hand, I have in mind another young grove in Yorba Linda where they took the wind into consideration and planted a windbreak. Their estimate was three tons and at present about 50 per cent of the fruit has been picked and we are not much off that estimate. After the wind, the boys picked up less than one lug of fruit on the ground. Some of the fruit on the trees does show a slight mark of being rubbed on limbs but I don't think the fruit from that grove will be graded to exceed 10 per cent wind-scars. My own individual experience is that I should have another windbreak down the center, rather than just depending entirely on the one on the east side of my orchard. The wind

is too strong for any one windbreak to stop. My neighbors are planting on the east of my place and I am hoping for better protection in the future.

Mr. Wahlberg: Time is practically up, but I notice Mr. O. A. Murray of the Irvine Ranch in the audience and I'd like to have him say a word. The San Joaquin and Irvine Ranches are examples which we can follow to advantage. They have a community system of windbreaks. I am going to ask Mr. Murray for just a few words about the effect of windbreaks.

IRVINE USES ROOT-CUTTER

O. A. Murray: If I had known that I would be called on to pinch-hit for Mr. Newman, I would have been in Mexico too. The windbreak system on the Irvine Ranch is one of the biggest advantages which we have in the permanent protection against breakage of trees. In one grove the trees are very far apart, trees very vigorous, some attaining 30 to 35 feet spread. Where the wind whips around the ends, it would take off one third of the trees, after we spent years of building the trees up. There is where your production goes in just one night. Wind whips around unprotected parts, defoliates trees, and breaks or damages small limbs. It has taken two or three years or longer to get back to normal production. I can't give you definite figures on the amount of fruit lost from wind damage. Years ago, before the regulations were so strict about marketing, we tried to protect all the fruit; pick it up and sell it. Lots of times we picked up more fruit from the ground than was left on the trees after the wind. One thing we have been doing to protect our orchards is to use a system of root cutting. We have a powerful root cutter, which digs a ditch five feet wide, going to a depth of four to five feet and cuts the roots and fills the dirt right back in. Although the trees are a little smaller at the windbreak, we think perhaps that is not altogether due to the root system of the windbreak trees. Might be due to two other factors— soil moisture taken into consideration, competition with the breaks, factor of shade and plant-food from the soil, which might be overcome by closer observation of irrigation and fertilization. I think that is all I have to say, Mr. Wahlberg.

Mr. Wahlberg: Mr. Murray pointed out the very things that I was going to consider—that is, that to those who feel that the competition is a major item, you can reduce the competition of the windbreak very materially by proper management as pointed out. First, be sure the windbreak has ample moisture; second, plant food and fertilizer; and third, cut the roots periodically. In that way it will not go out and rob adjacent trees. Now if those things are kept in mind and are practiced, we can reduce competition to a minimum, so that the windbreak is an asset rather than a liability. Many were taken out years ago because they were not properly managed They were allowed to grow like Topsy and compete with the grove. We are finding with more knowledge and management of these fine windbreaks that we can make an asset out of them and we can change the climate in our community if we are willing to devote a part of our land to wind protection. One windbreak is good but a community windbreak system improves the efficiency of each windbreak. We haven't covered the subject by any means but if we have given you something to think about and create action, we feel it has been worthwhile.