Magnum Leap In Orchard Floor Management

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Fifty years ago it was not uncommon to see newly planted trees and vines smothered by unwanted competing vegetation. In fact in some newly planted orchards the young trees and vines could not be seen from the heavy infestation of weeds. And it was not uncommon to see well established orchards and vineyards heavily populated with numerous species of winter and summer annual weeds and perennials such as Bermudagrass, johnsongrass, field bindweed, Russian knapweed and nutsedge.

Orchardists and vineyardists were aware of the harmful effects these unwanted competing plants had on the growth and productivity of their crop. Therefore, they spent many hours and precious resources in controlling the weeds in their newly planted as well as in their established orchards and vineyards. They knew that weeds not only adversely effected the growth of the trees and vines, but they competed for water and nutrients, they harboured insects, diseases, nematodes and they interfered with essential cultural practices and reduced the efficiency of harvest.

To control weeds and minimize their detrimental effects they repeatedly cultivated the orchard and vineyard floor and employed costly hand labor. As early as 1919 noncultivation was tried as a method of orchard floor management especially in citrus orchards with its shallow root systems. In the mid 30's citrus growers began using oils to control the weeds and by 1950 about 50,000 acres of citrus were under noncultivation. With repeated applications of petroleum distillates and heavy oils they were able to minimize or eliminate cultivation and reduce the need for hand weeding and the handling of orchard heaters.

In the early 50's, Boysie Day at U.C. Riverside successfully demonstrated the effective and safe use of substituted urea herbicides (monuron and diuron) for weed control in citrus orchards. A single application during the winter months provided effective seasonal control of most annual weeds. Needless to say, growers were very interested and many of them rapidly converted their orchards to complete nontillage management.

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In deciduous orchards and vineyards the task was somewhat more difficult, but during the past fifty years with the sue of selective herbicides we made significant progress in developing new techniques and methods in the management of orchards and vineyards. We evaluated many herbicides in a large number of different varieties of fruit and nut crops under varied irrigation and management practices. U.C.Extension workers like Art Lange, Clyde Elmore, Harold Kempen, Harry Agamalian and I conducted many applied research studies and field meetings showing farmers and pest control advisers the performance and selectivity of herbicides that today are widely used in orchard floor management.

With the intelligent use of herbicides orchard floor management practices have significantly changed during the past 50 years. You may not remember the time when the orchard middles had to be disked in one direction and a second time in the other direction to control the weeds in the tree row and often hand weeding was required to control the weeds around the base of the trunk. In vineyards French (Kirpy) plows were used to plow the weeds from the vine-row and later the soil had to be thrown back with a disk and in many vineyards, especially those infested with crabgrass and bermudagrass, costly hand weeding was required around the trunk. Repeated disking, harrowing and hand weeding were required to keep the unwanted vegetation under control to enhance the economical harvest of the crop.

Here is what we accomplished: With the use of herbicides in a narrow strip in the tree and vine rows we were able to reduce the need for cultivation by 50% and do away with costly hand weeding. By eliminating the need for cross cultivation growers were able to increase the fruiting branches on the trees, quadruple the number of trees planted per acre, reduce the need for the use of heavy tractors and utilize low volume emitters for irrigation.

Today, with the use of selective herbicides, fruit and nut growers have many options in managing the orchard floor. They have the option of using strip nontillage by applying herbicides in the tree row and disking the centers, or they can mow the resident vegetation (remember we used to call them weeds) and practice complete nontillage. Another option is to use

herbicides in the tree or vine row and to plant a cover crop between the rows. A fourth option would be to treat the entire orchard floor with herbicides. They can use any one or a combination of these methods to reduce soil compaction, improve water penetration and enhance all other needed cultural operations to achieve an integrated system of orchard management.

On the way we encountered many problems studying rates and proper timing of application and learning how to use these new chemical tools safely and effectively. We were able to accomplish this while complying with the requirements imposed by the EPA, CDFA and OSHA. We learned to knuckle under and comply with the myriads of permits, notifications, tests and licences that are required to enable us to apply a few pounds of herbicides per acre.

One of the early setback was presented by Rachel Carson in her well written popular book Silent Spring. She expressed some concerns that were justified and should have received more open-minded professional response from the scientific community.

What was more difficult and costly to live with were the protestations of some attractive looking people who knew nothing about agriculture and even less about the use of pesticides but their ignorance did not inhibit them from spreading half truths and often outright lies. Even worse were some tabloids using any means to attract attention to their misinformation.

Inspite of misguided and prevaricated protestations, we have made great progress during the past 50 years that we can justifiably call a **magnum leap in orchard floor management**. This is irrefutably evident when we compare orchard floor management practices pursued in the 50's and 60's with the ones practiced today. This is undoubtedly reflected in the quality and quantity of fruits and nuts we produce in California.

I don't want to leave you with the impression that all our problems are solved. There are many weed problems that require more effective control. Although we have demonstrated that nearly all unwanted vegetation can be controlled with the available tools (chemical and mechanical), we need to learn how to use them more effectively and more economically.

Growers and their pest control advisers are not doing an adequate job of properly identifying the weeds infesting their orchards and vineyards. And they are not keeping adequate records of their distribution. The consequences of poor herbicide selection can be costly and result in inadequate or no weed control. This can be illustrated by the grower who used oryzalin and wound up with a solid infestation of willow herb, or the one using simazine repeatedly and found his vineyard infested with bedstraw. The importance of knowing the weed infestation can not be over emphasised. California's orchards and vineyards are infested with a broad spectrum of weeds. Without their proper identification it is not possible to select the most effective tools for their economical management.

We have made great progress in integrating the use of cultural, mechanical and chemical practices. We have developed better techniques and tools for the safe and effective use of herbicides. We have controlled droplet applicators and more recently so called "smart sprayers". What we need is smarter applicators to use these tools effectively. When you think of it a "smart sprayer" is pretty dumb unless someone can properly identify the weeds, know their susceptibility to herbicides and select the most effective one to put into the tank.

We need better understanding of weed physiology, study their habit of growth, their distribution and their economic influence on crop production. There is great concern that the recently passed Food Quality Protection Act may result in the loss of widely used herbicides. To maintain their availability in the next 50 years we need to continue pursuing aggressive applied research studies of vegetation management. This challenging task is up to my younger colleagues and Clyde Elmore will look ahead and tell us what we can expect during the next fifty years.