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Vegetation Management in Avocados

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Studies were conducted (at several different locations) to determine if the rates of herbicides can be decreased by applying them in combinations and with adjuvants.

Combinations of glyphosate (Roundup), paraquat (Gramoxone), diuron (Karmex), fluazifop (Fusilade 2000), sethoxydim (Poast), prodiamine, pendimethalin (Prowl), oxyfluorfen (Goal), lactofen (Cobra), linuron (Lorox), norflurazon (Solicam), napropamide (Devrinal), oryzalin (Surflan), simazine (Princep), and new sulfonylureas with each other and with four spray additives were tested.

Low rates of some herbicides in combination are effective. More labeled uses of low-rate combinations are needed. Glyphosate mixes well with most herbicides, but its activity may be slowed by photosynthetic inhibitors such as simazine and diuron. Paraquat and diuron work well together on some weeds, but not on others; the mixtures cannot be used in avocados until diuron is registered. A simazine and norflurazon mixture controls a large number of annual weeds, but the high cost of the latter will reduce its usefulness. Some herbicide combinations are antagonistic and should not be used.

New research with sulfonylureas is of particular importance. They can be used at less than one ounce per acre. Some have low potential for causing environmental problems. There are sulfonylurea herbicides with soil and/or foliar activity. However, for best use they will be added with or in rotation with other herbicides to provide broad spectrum weed control and to prevent buildup of resistant weed populations. The sulfonylureas provide the potential as replacement for the long residual and leachable herbicides now used. However, they will be developed for avocados only if the industry aggressively seeks their registration. The avocado industry in California should be active in the adaptation of sulfonylurea herbicides to avocados. Their development and use should be phased in as the soil residual herbicides are phased out.

Research on application of herbicides through the sprinkler systems (herbigation) shows promise for controlling weeds in the wetted area around sprinklers. This research will be performed with norflurazon, trifluralin, oryzalin, and oxyfluorfen. Both the Environmental Protection Agency and the California Department of Food and Agriculture will monitor such uses very closely; and eventually, only short-residual, nonleaching herbicides will be allowed to be used through herbigation. These include trifluralin, oryzalin, and oxyfluorfen.

The transition of avocado orchards out of nontillage with herbicides being studied to determine if herbicide applications can be either skipped or stopped after soil residual herbicide treatments have been made for several years. Within two to three years after discontinuance of long-term soil residual herbicide treatments, over 30 weed species were identified that reinfest orchards. Early invaders include weed species that were established in the area before herbicide treatment began. Those commonly observed orchards removed from soil residual treatment included several spurges, chickweed, bermuda grass, malva, pigweed, annual bluegrass, annual sowthistle, sedge, oxalis, scarlet pimpernel, rescue grass, wild mustard, common groundsel, Johnson grass, flax leaf Fleabone, and little lovegrass. The shift in the vegetation complex should be monitored with different management practices. It is obvious that managed vegetation will require greater and more intense management and greater overall energy input than herbicide-based nontillage weed control. Middle management with low rates of Roundup sprayed once or twice a year and a wick application of Roundup to control escaped tall weeds appears to be promising in areas accessible to the equipment. The success of such a program will depend upon knowledge of weed species, herbicide selection, and timing of treatments.

Formulation of sprays to reduce leaching of herbicides is being investigated. Sodium polyacrylate added to simazine spray before application acts as a spray adjuvant/thickener and an adhesive to bind the herbicide to the soil. It is not yet known how well the polymers will perform under diverse field conditions in preventing ground water pollution while allowing adequate weed control. It is also probable that the best polymer for each leachable soil-applied herbicide will be different. The effect of long-term use of synthetic polymers on the soil will have to be determined.

Practical Applications and Summary

The project will insure that economical, effective, and environmentally safe weed control methods remain available to California avocado growers. Information is being developed concerning herbicide combinations that will reduce the total amount of any one herbicide being applied, while maintaining weed control and reducing possible environmental problems. New herbicides are being tested which will replace those which will be withdrawn. Spray formulations are being developed to reduce the leaching of simazine into the soil and thus lengthen the time it will be available for use.