volume.) As expected, the antitranspirant did not affect dry weights significantly. Thus, the increase in final fruit size by antitranspirant treatment was caused by improving the water status of the tree.

Fruit shrivel

The dry north wind in late October not only decreased fruit size but also caused extensive fruit shrivel on the unsprayed trees. The most striking effect of the antitranspirants was that they greatly minimized the incidence of the shrivelled fruit (see photograph and table 4). While 85% of the fruit on control trees were shrivelled and therefore unacceptable to the cannery, only 8 to 10% of fruit on antitranspirant-treated trees showed any signs of shrivel. The treated fruits were firmer and thus had a higher texture rating than the controls.

TABLE 1. ANTITRANSPIRANT EFFECTS ON DIFFUSIVE RESISTANCE AND PRESSURE POTENTIAL OF SEVILLANO OLIVE LEAVES AND FRUIT TWO DAYS AFTER SPRAYING

	Leaves		Fruit
	Resistance	Potential*	Potential*
	(min cm^{-1})	(atm)	(atm)
Control	0.077	-20.2	-24.9
CS-6432 (1.5%)	0.802	- 9.1	-17.3
RD-9 (1:8)	0.425	-10.6	-18.1
SEM ±	0.165	0.3	0.9
P <	0.05	0.001	0.001

*Greater negative value indicates more water stress.

TABLE 2. ANTITRANSPIRANT EFFECT ON SEVILLANO OLIVE FRUIT VOLUME (SPRAYED 10/20/71)

	Pre-Spray	Post-Spray					
	10/19	10/22		10/28		11/2	
	mm^3	mm^3	%	mm^3	%	mm^3	%
Control	6550	6596	100	6188	100	5744	100
CS-6432 (1.5%)	6550	6744	102	6614	107	6166	107
RD-9 (1:8)	6550	6722	102	6630	107	6274	109
SEM ±		2		4		54	
P <		0.001		0.001		0.001	

TABLE 3. ANTITRANSPIRANT EFFECTS ON SEVILLANO OLIVE DRY WEIGHT PER UNIT VOLUME (SPRAYED 10/20/71)

	Dry wt./vol (g/cm^3)		
	Pre-spray	Post-spray	
	10/20	10/28	11/2 (harvest)
Control	0.290	0.305*	0.321*
CS-6432 (1.5%)	0.285	0.311	0.319
RD-9 (1:8)	0.284	0.310	0.322
P <	NS	NS	NS

*Volumes adjusted by + 8% to compensate for smaller post-spray fruits.

TABLE 4. ANTITRANSPIRANT EFFECT ON FRUIT SHRIVEL AND TEXTURE OF SEVILLANO OLIVES AT HARVEST (11/2/71)

	Percent Shrivelled Fruit/Tree	Texture Rating*
Control	85	91
CS-6432 (1.5%)	10	107
RD-9 (1:8)	8	105
SEM ±	3	3
P <	0.001	0.001

*Arbitrary pressure units. Higher values indicate firmer fruit.

Fruit processing

Since removal of waxy materials from the fruit is desirable, samples of antitranspirant treated fruit were sent to a commercial cannery. The results were very encouraging in that one of the two antitranspirant materials was completely removed from the fruit surface by the normal lye and water process for black ripe olives, and the other material remained in only small amounts that were easily rubbed off. One of the materials was also completely removed by a green-ripe home process. The effects of remnants of wax films on olive grading and processing equipment, however, have not yet been evaluated.

Benefits

In summary, the benefits from antitranspirant treatment of olive trees include: (1) increased yield; (2) better dollar returns since more fruit will fall into higher and more favorably priced size grades; and (3) substantial reduction of fruit shrivel in areas where drying winds may desiccate the fruits, as in Northern California. In the Corning area during 1971, for example, antitranspirants could have made the difference between harvesting a satisfactory crop and no crop at all.

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In direct-seeded asparagus fields, areas where plants are missing (skips) can be filled in two times during the year following the seeding operation. Two methods discussed here have been used successfully to fill skips in direct-seeded experimental plantings at the University of California Agricultural Experiment Station at Davis: (1) transplanting one-year-old asparagus crowns or (2) planting asparagus seedlings that have produced secondary stems and roots.

Brian L. Benson

Transplanting into DIRECT

IT IS A COMMON CULTURAL PRACtice to leave the inverted bed open for a year following the direct seeding of an asparagus field. If skips are present they can be filled in the winter or early spring just prior to the time the beds are back-filled, with number 1, one-year old, dormant asparagus crowns. This method of filling in skips is quite similar to the crown transplanting of production fields. The transplanted crowns are approximately two to three inches nearer the soil surface than the established crowns after the beds are back-filled.

Transplanting seedling asparagus into skips while the beds are still open allows the transplants to grow at the same soil level as the established plants. Seedlings can be transplanted easily with a very low mortality rate over a period of several months using the tools and methods described here (see photos and sketch).

The tools can be made with a minimum of effort at a cost of less than $5 for the materials. The two coring tools (diagram) have 1-inch conduit pipe for handles. Three-inch and 2-1/2-inch thin-walled steel pipe is used to extract the cores. The beveled ends of the 3- and 2-1/2-inch steel pipe allow for easy removal of the soil cores. A piece of flat iron with a 1/8-inch slot, 3/4 inch deep, is used to bevel the ends of the pipes. A small amount of heat applied to the pipe will allow for a smoother bevel. A core extracting tool is used to

Photo left, tools used for transplanting seedling asparagus and core containing asparagus seedling. From left to right: Hole corer tool, plant core removing tool, soil core containing plant, and plant core extractor tool. Seedling sizes best for transplanting are shown in right photo of seedlings 6 to 8 weeks after emergence. Note the formation of secondary roots and stems.

SEEDED ASPARAGUS FIELDS

push out the soil core containing the plant to be transplanted.

The coring tool with the smaller outside diameter is used to dig the hole for the transplant to go into. The hole is dug by placing the tool on the desired spot and stepping on the top with a slightly twisting action. This tool makes a hole just slightly larger than the core containing the plant. The soil core can be removed easily by tapping the tool upside down on the ground.

The tool with the larger diameter is used to remove the plant that is to be transplanted. This is accomplished by placing the tool over the plant so that the plant is centered in the bottom opening. By stepping on the top of the tool in the manner mentioned above, a core of soil containing the plant can be removed. After lifting the tool containing the core and plant out of the soil, lay the tool on its side and shove out the core with the extractor tool. The core with plant can then be transplanted easily into the existing hole made by the first tool.

The transplanting operation should be done after the asparagus seedlings have formed their secondary roots and stems, (see photo), which is usually six to eight weeks after emergence. Normally there are thickly populated areas in the field that can be a close source of seedlings for transplanting.

The length of the core that is to be taken with the plant depends on the size of the plant. The larger the plant, the more soil will need to be taken in the core. Generally, a core 4 to 5 inches long will be sufficient to contain enough roots to ensure the survival of the transplant.

Soil moisture plays an important part in the removal of a core with the plant intact. The drier the soil, the harder it is to push the corer into the soil and the greater the chance that the removed core will disintegrate after it is removed from the coring tool. Too wet of a soil has a tendency to stick to the inside of the coring tool so that it is difficult to remove the core. At optimum soil moisture the coring tool can be pushed into the soil with relative ease and a well-shaped, intact core can be removed.

It is benefical to irrigate the transplants soon after the transplanting operation. This helps to fill the small voids between the core and the hole sides by washing in loose soil, allowing the transplanted plant's roots to grow into the surrounding soil.

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Schematic drawing of transplant tools.