Water sprays

High pressure water spraying was substituted for insecticides on elm, English oak, birch, pyracantha, plum, scarlet oak, beech, ash and big leaf maple. With trees greater than 30 ft in height, line pressures were increased to 600 psi to permit coverage of the highest parts of the infested portions of trees. Some large trees were only partially sprayed to remove localized infestations. Disadvantages of this technique include the possibility of severe leaf removal by the spray on lower portions of trees, fraying of foliage and excessive mortality to beneficial insects. However, through proper seasonal timing and adjustment of line pressures, water spraying is an extremely useful, inexpensive and harmless pest control technique.

Adhesive bands

The Argentine ant (*Iridomyrmex humilis*) occurs on most street trees in Berkeley and is associated with all of the pest aphid species. In many cases *I. humilis* increases population levels of honeydew producers, especially aphids, by interfering with beneficial insect populations. When aphid and ant populations are excessive, sticky adhesive bands of "Stickem" (1 inch wide, and 1/8 inch thick about 5 ft above ground) around tree trunks exclude ants and reduce aphid populations. This barrier is effective during spring, summer and fall, and although unsightly to some people, captures many insects, particularly flies. It also stops the passage of predators that have fallen from trees, but provides a nontoxic aphid control and ant management tool useful in urban areas.

Since many of Berkeley's pest aphids prefer the inner portions of host trees where the vegetation is usually more succulent and the temperatures are cooler, their populations can be reduced by selective pruning. Pruning for the reduction of preferred aphid food sources was used successfully on linden, elm, English oak and ash.

In 1972 reduced amounts of the insecticides diazinon and dimethoate were used because of better monitoring with fewer unnecessary treatments. In 1973 it was necessary to spot treat (with diazinon) six sweet gums (*Liquidambar styraciflua*) for heavy infestations of the calico scale (*Lecanium cerasorum*). Benlate, a systemic fungicide was used against ash anthracnose in 1972 and 1973. In 1972 about 400 (out of a total of 600) trees were sprayed while in 1973 about 100 were treated. In the future this number will probably be reduced still further by spot treatment of susceptible trees only.

Another important aspect of the program was the care to respond to citizens who called the Recreation and Parks Department about pest problems. Staff members contacted them directly and through written information sheets to explain the department's pest management decisions. These steps frequently helped such persons adapt during difficult periods when honeydew drip was excessive.

Inspection at the complaint site usually reveals one of three situations: (1) plant damage, (2) honeydew contamination, or (3) annoying insect populations. In the Berkeley study, priority lists for repeated monitoring were developed with plant-damaging insects first, then honeydew producers, and finally the annoyance problems. Depending on severity of the complaint, number of plants involved, and the investigator's judgment, particular problems were monitored and additional studies were undertaken. These studies helped to sort out the potential biological control candidates from those that could be managed otherwise.

In the three years Berkeley has had this program, pesticide costs have dropped, regular calendar spraying of large numbers of trees has been eliminated, complaints from citizens have been reduced, and an efficient organized approach to solving a complex management problem has evolved.

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Influence of

THE DEPTH at which asparagus crowns are placed in the soil or are direct-seeded varies in California between production areas and between growers in a single area. The influence of different seeding depths on asparagus production has not been clear. Some studies show that ridging increases yields. These studies do not specify the depth of soil cover over the plants, however.

This report summarizes the progress of both field and lathhouse studies initiated in 1969 to determine the effects of planting depth on the production of green asparagus. Results were judged in terms of earliness of production, yield as measured by number and weight of spears, and spear size.

Asparagus Var. 72 was direct-seeded into the bottoms of pre-formed furrows 2, 6, and 12 inches in depth. The plantings were made in double rows per bed at a seeding rate of 40,000 seeds per acre in May of 1969. The two rows were spaced 12 inches apart in the bottom of the furrows. Each treatment plot was 165 ft long, with rows on 5 ft centers, and was replicated four times in a randomized field plot design. The plants were grown the first season in open furrows with no additional soil cover. The second season the planted furrows in the two deeper treatments (6 and 12 inches deep) were filled with soil to the same height as the level of the beds in the 2 inch deep planting. This placed the crowns at a depth of 12, 6, and 2 inches below the soil surface.

The only change in cultural practices utilized in this test that differed from those used in commercial fields was the elimination of the rototilling operation in the spring during the preparation and shaping of the beds prior to harvest. This was necessary in order to avoid the possi-

planting depth on production of

GREEN ASPARAGUS

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bility of injury to those plants planted near the surface. The test plot was harvested for 30 days in 1971 and for 60 days in 1972 and 1973.

Earliness of production was based on the time required to produce 10,000 marketable spears per acre, since in all treatments there were occasional plants that initiated spears early in the spring.

The shallow plantings came into production considerably earlier than those planted deeper. Plants with 2 inches of soil cover were in production one week earlier than those with 6 inches of cover, and two weeks earlier than those with 12 inches. These results were expected, since the initiation and growth of a spear is a function of soil temperature.

The number of spears decreased with planting depth (table 1). Over a 60 day harvest period, the number of spears in the plantings 2 inches deep was nearly double that of the plantings 12 inches deep. Most of this increase can be accounted for during the first 3 weeks of the harvest period. By March 6, when the 12 inch planting attained 10,000 spears per acre, the production of the 2 inch plantings was 50,000 spears per acre.

Spear size expressed in weight (gms) increased markedly with planting depth (see table 1). The spears were separated by diameter into large, medium, and small grades. The number of large spears produced in the 2 inch plantings accounted for 3.75% of the harvest. With respect to weight, large spears in the 2 inch plantings accounted for 9.32% of the harvest. The figures for the 12 inch plantings were 16.02% and 29.35%, respectively (table 2). The majority of the spears in the 2 inch plantings fell into the small category.

The total yield expressed in weight (table 1) was greatest in the 6 inch plantings, which produced nearly as many spears as the 2 inch deep plantings while the spear size was almost as large as in the 12 inch plantings. Had the harvest been continued until equal numbers of spears were produced in each treatment, the yield results would have favored the 12 inch deep plantings.

Lathhouse study

A lathhouse study, utilizing tissue cultured clones to minimize genetic variation, was initiated in 1970 to check the results obtained in the field (under more controlled conditions)—and to determine whether the field results could be obtained by growing the plants with 2 inches of soil cover during the year, but temporarily covering them with soil only during the harvest period.

The lathhouse test was conducted in 32 gallon garbage containers, using as treatments the same crown depths as those used in the field study. Tissue cultured clones of plant F114 were used in this test. The plants were transplanted at a depth of 2 inches and grown at this depth the first season. During the second season, aluminum skirts 6 and 12 inches high were attached to the top of the garbage pails and filled with soil. After the harvest period (60 days) the skirts and soil were removed and the plants were grown with 2 inches of soil cover for the remaining ten months. All the treatments were replicated 5 times.

An additional treatment was included as a check and for gas analysis, soil temperature recordings, and moisture readings. After the first season's growth, the soil level over the crowns in this treatment was maintained at 12 inches throughout the entire experiment.

Results of the lathhouse test showed the same trends as those obtained in field studies. The plants covered with soil for 60 days during the harvest period showed increasing spear size with increasing soil depth. Measurements of cane diameter at 2, 6, and 12 inches above the crown showed a gradual enlargement of the spear diameter as the spear passed through the soil cover, whereas no enlargement of spear diameter was obtained in the treatment with no additional soil cover.

Studies are in progress to determine factors associated with the enlargement of spear diameter and to explore the possibilities of increasing the diameter of spears with chemical treatments, in the absence of soil cover.

TABLE 1.
THE INFLUENCE OF DEPTH OF PLANTING ON THE YIELD OF DIRECT SEEDED ASPARAGUS, 1972

Depth	Spears harvested/ acre	Wt./acre	Spear wt. (avg.)
inches	No.	lbs	gms
2	176,814	5796	14.12
6	153,648	6387	18.10
12	100,940	4618	20.59

TABLE 2.
THE INFLUENCE OF DEPTH OF PLANTING ON SIZE OF ASPARAGUS SPEARS

Depth	Number of spears		
	Large	Medium	Small
inches	%	%	%
2	3.75	37.07	59.18
6	10.38	48.76	40.86
12	16.02	49.68	34.30
	Weight of spears		
	%	%	%
2	9.32	49.61	41.07
6	21.64	55.27	23.09
12	29.35	52.13	17.89

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