carefully planned in crop rotations to avoid the build-up of resistant weed species. This can be accomplished by growing crops with herbicides recommended for the control of resistant weed species.

Annual grasses are easily controlled season-long with trifluralin (Treflan) applied at planting of young dormant grape vines. (Note weedy untreated plot in background).

If nightshade and groundcherry species build up after the extended use of trifluralin or diphenamid for tomatoes, a shift can be made to corn or milo and weeds can be controlled with atrazine; or a shift could be made to carrots and linuron, or the combination of another crop with an herbicide could be used that is effective against weeds in the potato family (*Solanaceae*).

Combinations of herbicides can also be used, however they are rarely ever more than additive. Usually there is a certain "phytotoxicity threshold" of herbicide necessary to obtain commercial weed control of a species or group of species. Cutting back on one herbicide in hopes that a minimum dose of another will make up the deficiency, is usually not adequate to broaden the number of species controlled.

This summary of family and species response is meant to help guide the intelligent choice of herbicides for specific weeds and for the selection of combinations in testing for broader spectrum weed control. This compilation of data and observations is not a recommendation for the use of herbicide combinations, but is rather a guide for pointing the way toward more effective weed control.

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Annual broadleaf weeds being controlled in melons by pre-emergence application of bensulide (Prefar), left, in contrast to untreated plot to right.

Effects and of

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THE PROPER TIME TO PLANT grape cuttings is not well established. Growers generally plant cuttings in March and April. Cuttings are made in the winter and early spring and are stored in the soil or refrigerated until they are planted. The best depth and position in the soil for cuttings in storage have also not yet been determined. It is becoming a common practice to refrigerate graftsticks, rootings and cuttings. The effects of this method of storage on subsequent rooting, and also the effects of the time of planting on rooting, needed researching.

Cuttings made

In January 1966, cuttings were made at the Kearney Horticultural Field Station at Reedley, California. They were stored in refrigeration at 32° to 36° F, and in sand in three positions: right side up, upside down and horizontal; and at 6 inches below the surface of the soil for the first two positions and 12 inches for the latter position. Cuttings were planted on February 15, March 15 and April 14. Rootings were dug January 1967, counted, graded and weighed.

Cuttings stored in sand rooted better than those stored in refrigeration (table 1). Cuttings planted April 14 rooted better than those planted in February and March. Position of storage in sand had no effect on rooting of the cuttings.

Stored upside down

Cuttings stored upside down in sand (table 2) and planted on April 14 gave the heaviest rootings. Cuttings stored in refrigeration gave the poorest rootings. Cuttings stored right side up and horizontal were intermediate in rooting weight.

In 1967, studies were made of the depth of storage of cuttings in sand and refrigeration. The cuttings were stored

# of storage conditions time of planting on rooting Thompson Seedless cuttings

at 18 and 36 inches (depths of the top buds below the surface of the soil). They were stored upside down since the results of the previous year indicated this to be the best method. Cuttings were planted on February 16, March 17, April 17 and May 15. The thermocouples of two recording thermographs were placed at the top bud—one at each level to collect temperature data during the storage period. Results shown in table 3 indicate that the cuttings stored in sand rooted better than those stored in refrigeration (except for the February and March plantings). There was no difference between storage depth in sand on rooting ability. Cuttings planted on May 15 did not root as well as earlier plantings.

Cuttings planted in April rooted the most heavily, as shown in table 4. Those planted in March and May were second. Depth of storage had no effect on the weight of the rootings. The cuttings stored in sand gave larger and heavier rootings than those stored in refrigeration.

There is a close relationship between the stage of shoot and root growth of the cuttings when planted and the size and percentage of rooting of the cuttings. Cuttings having both shoots and roots growing at the time of planting rooted the best.

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Comparison of Thompson Seedless rootings grown from cuttings stored in sand (heavier rooted vine to left) with cutting stored in refrigeration (cold storage), to right.

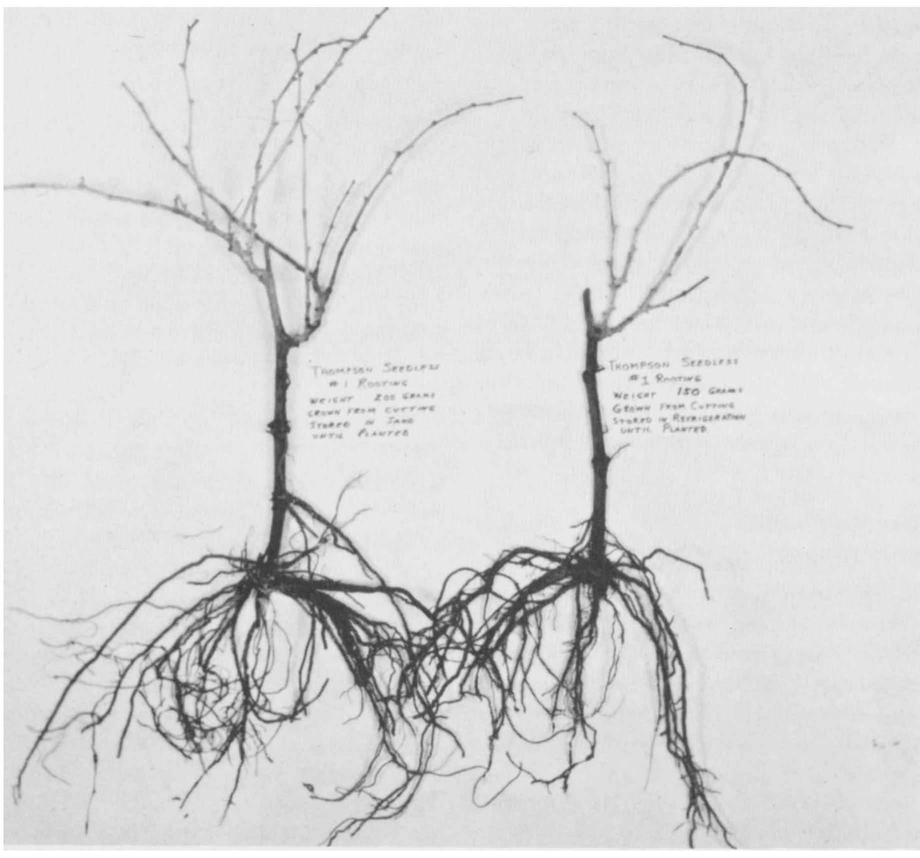

TABLE 1. EFFECT OF GRAPE STORAGE CONDITIONS ON PRODUCTION OF GRADE 1 AND 2 (USABLE) ROOTINGS OF THOMPSON SEEDLESS CUTTINGS, 1966 STUDY*

Type of storage	Position in storage	Per cent rootings† dug Feb. 15	Mar. 15	April 14	Mean
Sand‡	—Right side up	76.0	76.0	96.0	82.7^{a}
	—Upside down	74.0	80.0	98.7	84.2^{a}
	—Horizontal	80.0	80.7	94.7	85.1^{a}
Refrigeration	—Right side up	77.3	72.7	74.0	74.7^{b}
Mean		76.8^{d}	78.3^{d}	90.8^{c}	

* Different superscripts indicate significant differences at 1% level.
† Values represent means of 10 replications of 15 cuttings each.
‡ See text for depths.

TABLE 2. EFFECT OF STORAGE CONDITIONS ON WEIGHT OF THOMPSON SEEDLESS ROOTINGS, 1966 STUDY*

Type of storage	Position in storage	Mean weight rootings† Feb. 15	Mar. 15	April 14	Mean
		oz	oz	oz	oz
Sand	—Right side up	57.1	58.5	72.9	62.8^{b}
	—Upside down	58.9	58.9	83.8	67.2^{a}
	—Horizontal	59.6	53.5	67.1	60.4^{b}
Refrigeration	—Right side up	58.1	47.8	53.6	53.2^{c}
Mean		58.4^{e}	54.7^{e}	69.3^{d}	

* Different superscripts indicate significant differences at 1% level.
† Values represent mean weight of 10 best rootings in each replication.

TABLE 3. EFFECT OF DEPTH OF STORAGE AND REFRIGERATION ON THE PRODUCTION OF GRADE 1 & 2 (USABLE) ROOTINGS OF THOMPSON SEEDLESS CUTTINGS, 1967 STUDY*

Type of storage	Per Cent usable (grade 1 & 2) rootings† Feb. 16	Mar. 17	April 17	May 15	Mean
Sand—36" depth	98.0	94.7	98.7	90.0	95.3^{a}
—18" depth	97.3	98.7	94.7	94.7	96.3^{a}
Refrigeration	100.0	93.3	82.7	56.7	83.2^{b}
Mean	98.5^{c}	95.6^{c,d}	92.0^{d}	80.5^{e}	

* Different superscripts indicate significant differences at 1% level.
† Values represent means of 10 replications of 15 cuttings each.

TABLE 4. EFFECT OF DEPTH OF STORAGE AND REFRIGERATION ON WEIGHT OF THOMPSON SEEDLESS ROOTINGS, 1967 STUDY*

Type of storage	Mean weight of rootings† Feb. 16	Mar 17	April 17	May 15	Mean
	oz	oz	oz	oz	oz
Sand—36" depth	37.4	39.2	51.6	43.9	43.0^{a}
—18" depth	36.3	38.1	50.8	47.2	43.1^{a}
Refrigeration	32.3	37.6	47.2	34.4	38.2^{b}
Mean	35.3^{c}	38.3^{d,e}	47.6^{e}	41.4^{d}	

* Different superscripts indicate significant differences at 1% level.
† Values represent mean weight of 10 best rootings in each replication.