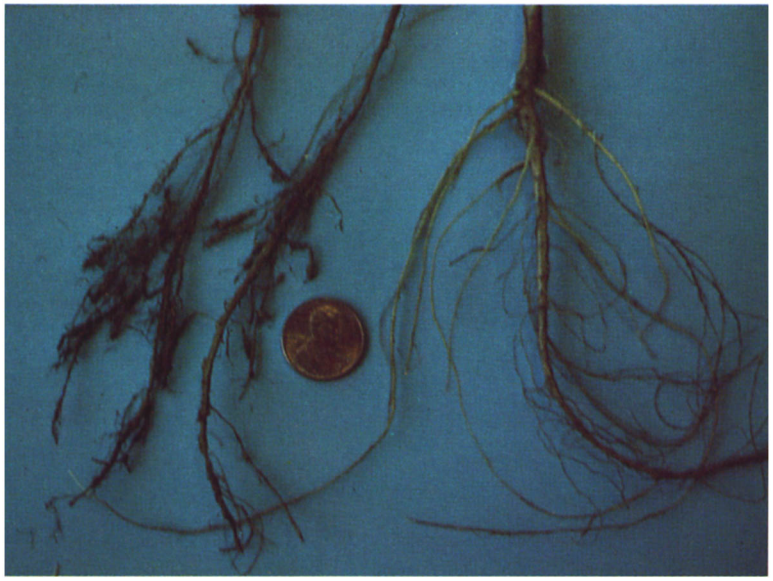
Root-knot-nematode-infected (left) and healthy roots of Rillito soybean.



Management of root-knot nematode on Rillito soybeans

Demetrios G. Kontaxis □ Robert W. Hagemann

Soybeans, *Clycine max*, have become a crop of economic appeal to many farmers in the Imperial County and elsewhere in California: In Imperial County during 1979 more than 3,000 acres were planted to soybeans, mostly the Rillito cultivar. Soybeans are subject to attack by root-knot, cyst, lesion, reniform, stunt, and dagger nematodes.

We conducted an experiment in Imperial County to evaluate Rillito for root-knot resistance. A field with sandy-loam soil was planted to Rillito following sugarbeets. The field was infested in spots with root-knot nematodes, and the sugarbeets grown in those spots the previous year had been severely infected.

Telone II (1,3-Dichloropropene) at 6 gallons per acre, was shank-injected 10 inches deep at listing time (June 1, 1978) in the bed. Twelve days later the field was planted to Rillito and furrow-irrigated. The experimental plots were four beds across the field with two plant rows per bed. Beds were 42 inches wide. Plots were randomized and replicated five times. Soil in the center of beds was approximately 88° F at a depth of 12 inches.

On October 5, 1978, 10 plants from each 100-foot plot were sampled at random and examined for root-knot galls. The crop was machine-harvested on November 7, 1978 (two beds, 50 feet long in each plot harvested).

Results and discussion

Two percent of the treated plants and 68 percent of the controls (nontreated) showed galls of various sizes and numbers.

Treated and nontreated plots yielded 25 and 18.6 bushels per acre respectively. Yield data were statistically significant at the 1 percent level (F49.78). Plants of the treated plots were generally taller than those of the nontreated plots.

The root-knot nematode was identified as *Meloidogyne javanica* by Dr. S.D. Van Gundy, Department of Nematology, University of California, Riverside.

The data show that Rillito cultivar is susceptible to root-knot nematodes and that such infection can significantly reduce yield. Based on this information, soybeans should not follow a crop that is susceptible to root-knot nematodes unless the soil is properly treated before planting.

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Rooting and growth of dormant grapevine cuttings

Dormant cuttings have occasionally been stored under refrigeration for more than a year and, when planted, have grown satisfactorily with no detrimental effects. To learn how cold storage affects rooting and growth, we kept cuttings under refrigeration for one or two years and then planted them in the nursery with fresh dormant cuttings.

Methods

Cuttings of wine cultivars Cabernet Sauvignon, Carignane, and Zinfandel were made up into bundles of 100 and placed upright in 4x4x3-foot fruit bins in January 1977. Moist wood shavings were packed around the cuttings, and a canvas cover was placed over the tops of the bins to prevent drying. They were stored at 32° to 35° F for one year.

In January 1978, some cuttings of each cultivar held for one year in refrigeration were taken from the bins and made into replications of 10 cuttings. At the same time, fresh dormant cuttings of these same cultivars were combined into similar small bundles. For the 1978 experiment, only fresh and one-year-old stored cuttings were compared.

Also in January 1978, bundles of 100 freshly made dormant cuttings of these same cultivars were placed in refrigeration along with bundles of one-year-old, dormant cuttings to be used for the 1979 planting season.

In both years the cuttings were planted in the nursery at the Kearney Horticultural Field Station at Parlier in a randomized order in nursery rows. The dormant cuttings, in 11 to 15 replications, depending upon the cultivar, were then placed in temperature-controlled callusing boxes and held at 80° to 85° F until they had callused, top shoots were out 1 to 2 inches, and roots were beginning to appear.

In the 1978 experiment, the cuttings were planted on April 20. The rootings were dug in January 1979, graded into four sizes, counted, and weighed.

The experiment was repeated in 1979 and cuttings that had been refrigerated for two years were included. Cuttings were made up into replications on February 14 and then held in heated callusing boxes for 2 weeks

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before planting in the nursery on April 4, 1979. Because of the heavy top growth made by the rootings, it was necessary to cut and weigh the top growth in December 1979 before the rootings could be dug. The rootings were dug in February 1980, graded, counted, and weighed.

Results

In the 1978 experiment, one-year-old refrigerated cuttings of Cabernet Sauvignon rooted just as well and as were the same size (weight) as fresh cuttings.

One-year-old refrigerated cuttings of Carignane and Zinfandel did not root as well as the fresh cuttings. There were no differences within cultivars in the sizes of the rootings that developed from fresh or one-year-old cuttings.

Fewer Carignane and Zinfandel cuttings grew into usable (#1 and #2) rootings than did Cabernet Sauvignon cuttings.

In the 1979 experiment, Cabernet Sauvignon cuttings stored one and two years rooted as well as fresh cuttings. Rootings from two-year-old stored cuttings were the same size as one-year-old rootings, but smaller than fresh rootings.

One-year-old Carignane cuttings rooted as well as fresh cuttings and better than two-year-old cuttings. Rootings from fresh and one-year-old cuttings were the same size. Rootings from two-year-old cuttings were smaller.

Fresh Zinfandel cuttings rooted the best; one-year-old cuttings were intermediate; and two-year-old cuttings were poorest. Sizes of the rootings were the same for all cutting ages.

Discussion

Cabernet Sauvignon and Zinfandel fruit ripen in early midseason. Carignane fruit ripens late. Thus, vines of Cabernet Sauvignon and Zinfandel have a longer time after harvest to mature their wood and increase carbohydrate levels. Cabernet Sauvignon wood is harder than that of Carignane or Zinfandel; Carignane and Zinfandel are similar, although Carignane wood generally is larger in diameter.

Time of fruit maturity and wood hardness may be important in longevity of cuttings. Longevity of Zinfandel wood was better than that of Carignane in that both one- and two-year-old cuttings of the former variety had higher mean rooting. Viability of Carignane cuttings drops greatly by the second year of storage. Zinfandel wood may have better longevity, since it matures its fruit earlier than Carignane and can thus store more carbohydrates in the vine after harvest.

Also, Carignane vines usually bear much heavier crops than Zinfandel, which may contribute to a higher stored carbohydrate level in Zinfandel canes.

In summary, dormant cuttings of Cabernet Sauvignon stored under refrigeration for one and two years rooted as well as freshly made dormant cuttings. The rootings that grew from one-year-old stored cuttings were just as large as those from fresh cuttings. Rootings from two-year-old stored cuttings were the same size (weight) as those from one-year-old stored cuttings, but smaller than freshly made cuttings.

In 1979, dormant one-year-old stored cuttings of Carignane rooted as well as fresh cuttings and better than two-year-old stored cuttings. In 1978, dormant one-year-old cuttings of Carignane did not root as well as dormant fresh cuttings. The sizes (weight) of the rootings from fresh and one-year-old cuttings were the same. Rootings from two-year-old cuttings were smaller.

Fresh dormant cuttings of Zinfandel rooted best, one-year-old cuttings rooted second best, and two-year-old cuttings were the poorest. The sizes (weights) of the rootings were the same, regardless of the age of the cuttings.

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TABLE 1. Rooting of Fresh and One-year-old Dormant Cuttings 1978

Cultivar	Number of reps.*	Mean number of rootings†		Mean weight†
		Total	#1 & #2	#1 & #2 rootings
				oz
Cabernet Sauvignon				
Fresh	11	9.6 a	9.0 a	4.0 ab
One-year-old	11	9.6 a	8.0 ab	4.9 a
Carignane				
Fresh	16	9.5 a	7.9 ab	3.6 b
One-year-old	16	3.4 c	2.9 e	4.0 ab
Zinfandel				
Fresh	15	8.7 a	6.7 c	3.3 b
One-year-old	15	7.2 b	4.5 d	3.5 b

*Each replication consists of 10 cuttings.
†Numbers followed by different letters significant at 5%.
LSD 0.05 for total rootings = 1.02.
LSD 0.05 for #1 and #2 rootings = 0.65.
LSD 0.05 for weight of #1 and #2 rootings = 0.97.

TABLE 2. Rooting of Fresh, One- and Two-year-old Dormant Cuttings, 1979

Cultivars*	Mean number of rootings†		Mean wt.†
	Total	#1 & #2	#1 & #2 rootings
			oz
Cabernet Sauvignon			
Fresh	9.4 a	8.0 b	10.2 a
One-year-old	9.0 a	7.9 b	9.1 ab
Two-year-old	9.1 a	8.6 ab	8.3 b
Carignane			
Fresh	6.5 c	5.9 cd	9.3 ab
One-year-old	7.3 bc	6.9 c	8.6 ab
Two-year-old	1.0 d	0.9 e	5.1 c
Zinfandel			
Fresh	9.4 a	9.2 a	5.7 c
One-year-old	8.0 b	6.9 c	6.0 c
Two-year-old	6.0 c	5.2 d	6.0 c

*Each treatment is made up of 15 replications of 10 cuttings.
†Numbers followed by different letters are significant at 5%.
LSD 0.05 for mean number of rootings = 0.87.
LSD 0.05 for mean #1 and #2 rootings = 0.96.
LSD 0.05 for mean weight of rootings = 1.7.