ROUNDUP - - a new perennial

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TABLE 1. A COMPARISON OF HERBICIDES FOR PERENNIAL WEED CONTROL

Herbicide	Total lb/† per season	Commercial Control* Johnson grass	Bermuda grass	Purple Nutsedge	Bind weed
Glyphosate	2–4	+	+	—	∓
Glyphosate	4–8	+	+	+	+
2,4-D	2–4	—	—	—	+
2,4-D	4–8	—	—	∓	+
MSMA	4–8	+	—	—	—
MSMA	8–16	+	—	+	∓
Dalapon	4–8	—	∓	—	—
Dalapon	8–16	+	+	—	—

* Commercial control indicates between 70 and 100% control, i.e. no crop loss due to competition.

Ratings: + = commercial control; — = no commercial control; ± = results variable.

† Total pounds of active ingredient per year applied in small repeated applications. Glyphosate and 2,4-D at approximately 2 lbs/A repeated application, MSMA and dalapon at 4 lbs/A repeated application.

Heavy infestation of Johnsongrass in a vineyard.

PERENNIAL WEEDS are an increasingly important problem in California. This may be due in part to the increased use of preemergence herbicides which reduce the competition to perennial weeds from the normally more prevalent, faster growing, annual weed species. In the process we have increased the relative influence of perennial weeds. Perennial weeds are usually deep rooted; and most often regenerate themselves by growing from underground rootstocks (rhizomes and stolons). Preemergence weed killers are usually ineffective against such large underground storage organs because they are designed to kill only newly germinating weed seedlings close to the surface of the soil.

Morning glory (perennial bindweed or *Convolvulus arvensis*) has recently become widespread throughout California, particularly in the row crops of the west side of the San Joaquin Valley.

Bindweed, bermudagrass, and johnsongrass have greatly increased in orchards and vineyards where soil-persistent herbicides have been used. Where trifluralin has been used in orchards and vineyards a wall-to-wall carpet of nutsedge (nutgrass or *Cyperus rotundus* and *C. esculentus*) can often be found. This same massive build-up is occurring in many cotton soils.

For several years work has been directed at trying to control perennial weeds. Herbicides like MSMA on johnsongrass and nutsedge in cotton, Hyvar-X in citrus, 2,4-D for bindweed in certain orchard and vineyard crops, and for grain land and non-crop land have helped diligent farmers, landscapers, homeowners and weed fighters in general to hold their own, but the progress of control has been too slow. The perennial has been moving out of the non-crop areas into once productive crop land.

The work over the past year in California and past 2 years elsewhere has brought forth a new champion against perennial weeds. This new herbicide "Roundup," has great promise against perennial weeds. It has the equally unusual common or generic name of glyphosate. (It has had many numbers including MON 2139.) It is nonselective, killing all plant species yet tested. Roundup is also very low in mammalian toxicity; it adsorbs or fixes rapidly in soil, and then appears to break down completely into nontoxic chemicals.

This new "environmentally safe" compound will control such major perennial weeds as johnsongrass, bermudagrass, bindweed and nutsedge. It may also control many of the less important perennial weeds in California. Roundup works better than previous herbicides because it moves fast into the underground tissues of the perennial weeds, killing those underground storage organs that have heretofore been so difficult to destroy. It appears to move faster than MSMA and much deeper than 2,4-D. In tests, when only 1 leaf of a bean plant was wet with a low rate of Roundup, the whole plant succumbed, while only the treated leaf, itself was killed with 2,4-D.

When both MSMA and glyphosate (Roundup) were sprayed on mature

weed killer

johnsongrass, glyphosate moved faster in timing studies than MSMA and killed more underground tissue as expressed by reduced regrowth of Johnsongrass when sprayed earlier (before cutting) with glyphosate.

Where young trees and vines have been sprayed with Roundup they have shown less apparent symptoms after spraying than with 2,4-D or MSMA. It will damage young trees and vines, however, thus requiring careful spraying away from the foliage and trunks of trees and vines. No effect has been found from root uptake of the material through the soil, in field studies.

Like any sprayed chemical, Roundup will drift. The damage was minimal, however, compared with 2,4-D and dicamba on cotton and beans. Much more work will be necessary on a great many crops to fully evaluate the importance of drift.

Even though this new "dragon slayer" may be the most promising new herbicide since the advent of 2,4-D it is not always successful. Not all perennial weeds are killed with "one shot." Two and sometimes three sprayings are needed for most efficient and effective control. Perennial weeds growing with a constant supply of water such as drip irrigators, are harder to kill than those allowed to dry down on a ditch bank at the end of the season. Old stands of perennial weeds will need to be broken up before spraying, so tillage will still be necessary. Because of the naturally delayed growth of nutsedge tubers and other dormant portions of perennial weeds, follow-up sprays will be imperative to maintain the advantages produced by initial sprays of Roundup. There is no substitute for good cultural practices in combination with careful use of chemicals.

We need to learn much more about this new compound before we can realize its full potential. However, it is exciting to think that we may at last get the upper hand and stop the enormous losses to agricultural production brought about by perennial weeds.

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Perennial bindweed has become widespread in California, particularly on the west side of the San Joaquin Valley.

TABLE 2. A COMPARISON OF THE PHYTOTOXICITY OF FOUR HERBICIDES ON YOUNG PEACH AND GRAPE PLANTS*

		Young peach					Young grape				
Herbicide	Rates	Buds	Foliage	Green stem	Brown stem	Basal bark	Buds	Foliage	Green stem	New Brown bark	Basal bark
Glyphosate	Low	+	+	+	∓	—	—	+	∓	—	—
Glyphosate	High	+	+	+	+	—	+	+	+	?	—
MSMA	Low	—	+	—	—	—	—	+	?	?	—
MSMA	High	+	+	+	?	—	?	+	?	?	—
Dalapon	Low	—	—	—	—	—	—	—	—	—	—
Dalapon	High	—	+	?	—	—	—	+	?	—	—
2,4-D	Low	—	+	—	—	—	?	+	—	—	—
2,4-D	High	+	+	+	?	—	+	+	+	?	—

* Ratings: + = Commercially unacceptable.
— = Very little significance to the producer or none.
? = Insufficient information.
Results summarized here represent one year's observations and data. More work will be necessary to properly establish more usable information.

TABLE 3. A SUMMARY OF COMPARISONS OF 4 HERBICIDES FOR BINDWEED CONTROL IN NON-CROP LAND

		Experiment No.*							
Herbicide	lb/A	1	2	3	4	5	6	7	Ave.
		Bindweed Control rating†							
Glyphosate	1	—	—	1.0	5.5	—	—	5.0	3.6
Glyphosate	2	8.3	—	—	6.2	8.0	—	5.3	6.4
Glyphosate	4	8.3	—	5.0	7.7	10.0	8.0	7.3	7.7
Glyphosate	8	8.7	—	—	—	9.7	6.8	—	8.4
Glyphosate	16	—	—	7.0	—	—	—	—	7.0
2,4-D	1	—	5.0	4.0	6.7	—	—	8.3	6.0
2,4-D	2	—	—	5.3	6.7	—	—	—	6.0
2,4-D	4	—	7.0	3.7	6.5	—	2.0	—	4.8
2,4-D	8	—	8.0	—	—	—	—	—	8.0
Dicamba	1	—	8.5	8.0	—	—	—	—	8.2
Dicamba	2	—	—	6.0	—	—	—	—	6.0
Dicamba	4	—	9.5	9.0	—	—	—	—	9.2
Dicamba	8	—	10.0	10.0	—	—	—	—	10.0
MSMA	1	—	3.2	—	—	—	—	—	3.2
MSMA	2	—	1.2	1.7	—	—	—	8.3	3.7
MSMA	4	—	2.2	4.0	—	—	—	—	3.1
MSMA	8	—	3.2	1.0	—	—	—	—	2.1

[1] = Treated 10/13/71, Evaluated 5/10/72
[2] = Treated 11/24/71, Evaluated 5/11/72
[3] = Treated 10/13/71, Evaluated 5/10/72
[4] = Treated 6/6/72, Evaluated 8/21/72
[5] = Treated 6/29/72, Evaluated 8/16/72
[6] = Treated 10/13/71, Evaluated 7/12/72
[7] = Treated 4/28/72, Evaluated 7/12/72
† Average of 3–4 replications per experiment conducted at 6 locations.
* Experiment numbers:
Ratings: 0 = no control 7 = commercially acceptable control; 10 = complete kill as observed at time of rating.