The Effect of Herbicide Combinations on Growth and Yield of 'Kinman' Guar (Cyamopsis tetragonoloba (L.) Taub.)

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This test was conducted at the University of Arizona's Casa Grande Highway Farm to evaluate the effects on 'Kinman' guar of 3 herbicide combinations applied for weed control.

On July 17, 1979, a broadcast application of 77 kg/ha actual N (applied as 21-0-0) was made over the soil (44% sand, 36% silt, 20% clay, 1% organic matter, pH 7.7), followed by a broadcast application of trifluralin at 0.6 kg/ha. Both fertilizer and herbicide were then incorporated into the soil by harrowing followed by bed shaping on 102 cm centers.

Guar var. 'Kinman' seed was planted two rows per bed to a depth of 1 cm into dry soil and irrigated up to a stand of approximately 50 plants per m. This stand was thinned to about 30 plants per m.

Plots (4.6 m by 2 m) were marked out for preemergence and postemergence herbicide treatments. On July 21, preemergence treatments of 0.3, 0.6, and 0.9 kg/ha of linuron and metribuzin were sprayed over the shaped beds but not incorporated. On August 15, when the guar was 10 cm tall, postemergence treatments of acifluorfen at 0.6, 1.1, and 1.7 kg/ha were applied overtop of the plants. Check plots received no treatment other than the preplant incorporated application of trifluralin, which was common to all the treatments.

Four irrigations, totalling approximately 50 cm of water, were applied between planting and harvest on November 25.

Injury was rated on August 28. Height was measured on September 25, during the pod-filling stage, after which no height increase occurred.

On November 25, plots were hand harvested for 2 sections per plot, each 3 m in length. Plants were threshed in the field using a Vogel threshing machine.

Herbicide*	Rate kg/ha	Injury[a] 0=none 100=dead	Height[a] (cm)	Yield[a] kg/ha
linuron	0.3	0 a	24 ab	1266 a
linuron	0.6	0 a	21 bc	1490 a
linuron	0.9	10 b	21 bc	1322 a
metribuzin	0.3	30 c	20 bc	1000 b
metribuzin	0.6	40 d	8 f	515 d
metribuzin	0.9	60 e	8 f	672 cd
acifluorfen	0.6	10 b	18 cd	820 bc
acifluorfen	1.1	10 b	15 de	1080 b
acifluorfen	1.7	10 b	13 e	890 bc
check		0 a	26 a	830 bc

[a] Values within a column followed by the same letter are not significantly different at the 5% level.

* Each herbicide occurs in combination with 0.6 kg/ha trifluralin applied preplant incorporated.

In this test, the best yielding plots were those treated with varying rates of linuron applied preemergence in combination with trifluralin applied preplant incorporated.

Linuron at 0.9 kg/ha caused slight stunting of guar, but no yield reduction compared to the 0.6 and 0.3 kg/ha rates.

Metribuzin applied preemergence at 0.3 kg/ha reduced guar stand, stunted surviving plants and reduced yield.

Acifluorfen applied postemergence overtop burned guar foliage but the plants recovered. However, maturity was delayed, resulting in a yield reduction when late maturing pods were injured by frost in mid November.

Weed competition in the check plots appeared to be responsible for the lower yield obtained.

Linuron, metribuzin, and acifluorfen all provided satisfactory weed control (data not presented) except that linuron and acifluorfen did not control wooly morning glory. Broadleaf weed competition in the check plots was severe enough to have impeded mechanical harvesting if this had been attempted.

Barley and Other Plant Species Established on Coal Mine Soil

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Summary

More seedlings were established per unit area with conventional culture (without Hold-Gro Erosion Control Fabric) than were established with Hold-Gro Erosion Control Fabric for all plant species studied. Barley produced rapid, uniform,and attractive vegetation on coal mine soil in northern Arizona.

Experiments were conducted on the Black Mesa Coal Mine, Kayenta, Arizona in 1977 and 1978 to study the use of Hold-Gro Erosion Control Fabric in the establishment of plants on coal mine soil following the surface mining of coal. The Hold-Gro Erosion Control Fabric was manufactured and provided by the Gulf States Paper Corporation, Tuscaloosa, Alabama. Four plant species were used: (1) spring barley (Hordeum vulgare L.), (2) crested wheatgrass (Agropyron cristatum (L.) Gaertn.), (3) alfalfa (Medicago sativa L.), and (4) fourwing saltbush (Atriplex canescens (Pursh.) Nutt.). Spring barley, crested wheatgrass, alfalfa, and fourwing saltbush are an annual grass, a perennial grass, a perennial legume, and a perennial shrub, respectively.

Each plant species was planted in reclaimed coal mine soil, at the recommended planting rate, in the spring of the year, using both conventional culture and Hold-Gro Erosion Control Fabric. Each species was fertilized with 560 kg/ha of 16-20-0 commercial fertilizer, at planting time, and irrigated with a sprinkler irrigation system to assure that it was never stressed for soil-moisture throughout the growing season. Seedling establishment counts were taken 12 weeks after planting.

Average numbers of seedlings established in coal mine soil for barley, crested wheatgrass, alfalfa, and fourwing saltbush are reported in Table 1. More seedlings were established per unit area without Hold-Gro Erosion Control Fabric (conventional culture) than were established with Hold-Gro Erosion Control Fabric for all species studied. Barley produced rapid and uniform stands of vegetation on coal mine soil. Barley also produced seeds at the end of the growing season, which fell to the soil surface, where they germinated and established new seedlings the following year. After establishment, the other three species grew well in coal mine soil.