

EVALUATION OF ACIFLUORFEN FOR ANNUAL PLANTED STRAWBERRIES,
FRAGARIA X ANANASSA

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Summary. The information collected in a three year study from 1984 to 1986 indicates excellent selectivity with acifluorfen on California strawberry cultivars. The most effective and safe method of treatment is a pre-plant application. The registration of acifluorfen for California strawberries would greatly improve present day weed management options.

INTRODUCTION

Strawberries are grown in California as an annual crop. The primary method for weed control is the use of methyl bromide as a pre-plant soil fumigant. Three major weeds not controlled by methyl bromide are little mallow, *Malva pariflora*, California burclover, *Medicago polymorpha* L., and whitestem filaree, *Erodium moschatum* (L.) L'He'r. The objectives of these experiments were to evaluate acifluorfen on four strawberry cultivars: Chandler, Heidi, Pajaro and Selva, and to determine a method of application for maximizing strawberry selectivity. Although there are several existing registered herbicides for strawberries, their utilization by growers has been restricted because of poor performance and/or crop damage. The fate of methyl bromide as a continued pesticide has been under review by regulatory agencies due to possible contamination of ground water; the loss of this biocide would greatly affect weed control practices.

METHODS

The three year study included pre-plant and post-plant pre-emergence applications of acifluorfen to dormant transplants. In California, dormant refers to a plant held in cold storage and transplanted in September through November, depending upon cultivar. The plant grows vegetatively through autumn and bears fruit in late winter-early spring. Acifluorfen was applied at 0.28, 0.56, 0.84 and 1.12 kg a.i./ha in 1984, 1985 and 1986. The herbicide was applied in 325 L/ha using a CO₂ backpack sprayer. Preplant applications were made to preformed beds, followed by transplanting within 24 hours. Post-plant applications were made to recent transplants. All treatments were followed by sprinkler irrigation within 24 hours. In most situations the amount applied was 2.5 cm of water. Experimental design was a completely randomized block design with four replications. Plot size was generally 10 or 15 m². Experimental locations covered several soil types, with two soil textures: Elkhorn fine sandy loam (88.8% sand, 5.3% silt, 6.2% clay and 0.8% O.M.) and Chualar loam (50.1% sand, 31.5% silt, 18.4% clay, 1.2% O.M.).

Efficacy evaluations were made on little mallow, burclover and whitestem filaree. Strawberry tolerance was visually assessed and runner weights and fresh fruit yields were recorded.

RESULTS AND DISCUSSION

Initial experiments conducted in 1984 with the cultivars Pajaro and Heidi were designed to establish the most effective application method for acifluorfen selectivity in strawberries. These studies indicate that pre-plant application, followed by transplanting into the treated soil, provided greater tolerance than post-plant treatments (Table 1). This was evident at the

higher rates of 0.84 and 1.12 kg/ha. Besides strawberry tolerance considerations, the practical application of spraying the herbicide before planting lends itself to a better management system than spraying the herbicide after planting. The timeliness of moving sprinkler systems into the field and avoiding spray drift to transplanting crews becomes important to the California grower.

Table 1. The effect of timing of herbicide application on the yield (kg/ha) of strawberry cv. Pajaro and plant vigour (%) of cv. Heidi

| Herbicide | Rate | Time of application ^a | Berry yield of | Score of plant |
|-------------|---------|----------------------------------|----------------|---------------------|
| | (kg/ha) | | cv. Pajaro | vigour of cv. Heidi |
| | | | (kg/ha) | (%) |
| Acifluorfen | 0.56 | Pre | 1706 | 98 |
| Acifluorfen | 0.56 | Post | 1770 | 96 |
| Napropamide | 4.48 | Pre | 1521 | 99 |
| Control | - | - | 1693 | 100 |

^aPre = pre-plant surface applied;

Post = post-plant pre-emergence

Strawberry tolerance data was obtained from harvested runner weights 85 DAT (Table 2). Runners are normally pruned in California strawberry culture to force growth toward crown development. In one study with the cv. Chandler, significant differences in runner weights were evident at the 0.84 and 1.12 kg/ha over the weeded control. Runner weights from Pajaro showed no significant differences in runner weights at 0.28, 0.56, 0.84 and 1.12 kg/ha yield data obtained from the experiments, usually in six week harvest periods.

Table 2. Effect of time of application of acifluorfen on the dry weight of strawberry runners (cvv. Chandler and Pajaro)

| Herbicide | Rate | Time of application | D.W. ^a | |
|-------------|---------|---------------------|-------------------|------------|
| | | | Chandler | Pajaro |
| | (kg/ha) | | (g/plot) | (g/runner) |
| Acifluorfen | 0.56 | Pre | 526 a | 4.6 a |
| Acifluorfen | 0.56 | Post | - | 4.4 a |
| Acifluorfen | 0.84 | Pre | 391 b | - |
| Acifluorfen | 1.12 | Pre | 468 b | - |
| Napropamide | 4.48 | Pre | - | 3.1 b |
| Control | - | - | 567 a | 5.0 a |

^aValues within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test

Acifluorfen at 0.28, 0.56 and 0.84 kg/ha resulted in no significant yield differences from Chandler (Table 3), Heidi, Pajaro or Selva when applied as a pre-plant application. Post-plant applications to Heidi in one experiment resulted in no significant differences at 0.56, 0.84 and 1.12 kg/ha when compared to the weeded control.

Table 3. The effect of pre-plant surface applied acifluorfen on the yield and quality of strawberry cv. Chandler

| Rate (kg/ha) | Berry yield ^a (t/ha) | Berry weight (t/ha) | Fruit firmness |
|-----------------|------------------------------------|------------------------|----------------|
| 0 | 6.25 a | 22.9 | 5.8 |
| 0.56 | 6.39 a | 23.4 | 6.4 |
| 0.84 | 5.62 b | 22.6 | 5.9 |
| 1.12 | 6.43 a | 24.1 | 5.4 |

^aValues within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test

Of the three weeds evaluated in these experiments, excellent control of little mallow was obtained at all rates (Table 4). Burclover and whitestem filaree control was 80% or better with 0.56 kg/ha, but less effective at 0.28 kg/ha. Residual control of these three species was evident for 150 days following treatment.

Table 4. Efficacy of pre-plant surface applied acifluorfen on three weed species (% control)^a

| Rate (kg/ha) | Little mallow | Red stem filaree | California burclover |
|-----------------|------------------|---------------------|-------------------------|
| 0 | 0 | 0 | 0 |
| 0.28 | 85 a | 82 | 70 a |
| 0.56 | 95 b | 90 b | 90 b |
| 0.84 | 100 b | 100 b | 100 b |

^aValues within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test