

Title:

Strawberry Weed Control

Extension Proposal:

IR-4 and the Southern Region Small Fruit Consortium Extension / Outreach Proposal

Principal Investigator:

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Potential Cooperators:

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Objectives:

- 1) To demonstrate and evaluate potential preemergence herbicides for use in matted-row strawberry production in the Mid-South.
- 2) To demonstrate and evaluate potential postemergence herbicides for use in matted-row strawberry production in the Mid-South.

Justification:

Matted-row or perennial strawberry producers have very few weed control options. Fumigation has often been utilized, but with the scheduled phase out of methyl bromide, that source will no longer be a treatment option. With the exception of methyl iodide (which is not yet labeled for use in strawberries), the alternatives are not as efficacious in controlling weeds as was methyl bromide.

The only two preemergence herbicides labeled for strawberries are napropamide (Devrinol) and terbacil (Sinbar). Devrinol provides control of several annual grass and small-seeded broadleaf weeds. However, Devrinol has been known to prevent rooting in strawberries. Therefore, its use is not recommended until the fall after daughter plants are rooted and established (late fall). Some producers also use Devrinol for grass control in the spring of the year in established matted-row strawberries. Sinbar can be used after renovation of established strawberries and during the winter when plants are dormant. It also provides activity on some grass weeds and some broadleaf weeds. The disadvantage of using Sinbar is that it can cause injury in some varieties. The injury is also related to soil organic matter content (do not use on soils with less than 2% organic matter). Oxyfluorfen (Goal) can be applied as a stale seed bed treatment 30 days prior to planting. However, due to plantback interval few growers in the Southern U.S.

utilize this product in strawberries.

Three options for postemergence grass control are available: clethodim (Select), fluzifop (Fusilade), and (sethoxydim) Poast. Poast and Select can be used 7 and 4 days prior to harvest, while Fusilade cannot be used within 1 year of first harvest.

Fewer options exist for postemergence control of broadleaf weeds. 2,4-D Amine can be used during summer renovation and winter dormancy. However, in many parts of the Mid-South, close proximity to sensitive crops (tobacco, tomatoes, cotton, etc.) prevents its use during the summer months. Clopyralid (Stinger) has received 24(c) registration in much of the Mid-South. It can be used at the same times as 2,4-D Amine. However, Stinger's spectrum of activity is much more limited as compared to 2,4-D Amine.

Paraquat (Gramoxone Max) and glyphosate (Roundup) can be directed to control weeds in the middles. However, due to their non-selective nature, they are not labeled for broadcast use.

Some additional herbicides are being suggested as having a potential fit for use in matted-row strawberry production. However, more data is needed to determine which products or combination of products provides the best weed control, while causing the least injury. Several trials have been conducted evaluating some of these products; however, due to the intense and laborious nature of such work, few trials have been conducted collecting yield data. Yield data is needed to convince the crop protectant companies of the safety of the product on strawberries. Some registrants are telling researchers that they will require two years of data from multiple locations before they will consider labeling a product. This is an effort to generate some of the needed data for registrants to pursue labeling these products, as well as demonstrate to growers what will provide acceptable weed control.

Methodologies:

In 2005, 4 trials were conducted to evaluate different herbicide treatments in matted-row strawberries. The first three trials were conducted on established 'Allstar' plants in Sumner Co., TN. Two of the trials focused on the postemergence weed control in established strawberries. The trial including Chateau was partially funded by Valent USA Corporation. Treatments were applied in March while the strawberry plants were still dormant. For a complete list of treatments and application information see Tables 1 through 4. The goal of the third trial was to provide preemergence control of grass and broadleaf weeds in established matted-row strawberries. Since some weeds had already emerged, most of the treatments received an application of Gramoxone Max at 1 pint/A to burn them back. A complete list of herbicide treatments, along with application information can be seen in Tables 5 and 6.

The last trial was conducted in Scott Co. VA. The purpose of this trial was to evaluate preemergence herbicides in newly planted matted-row strawberries. A complete list of treatments and application information can be viewed in Table 7 and 8.

For all trials, treatments were evaluated in a randomized complete block design with 4 replications. Dependent variables found to be significant at the 0.05 level of probability were subjected to Duncan's Mean Separation technique.

Results:

Trial 1: Chateau and Gramoxone / Postemergence Weed Control in Established Strawberries

There was no visible sign of crop injury. However, once the plants broke dormancy and started to grow there were obvious vigor differences across the field. The variation could not be

blocked by replication or treatment; therefore it was determined that yield data would be of no value and was not taken.

Every treatment except the UTC provided 100% control of henbit (data not shown). The control of common chickweed was not as good as that observed in the past, likely due to “cold” temperatures around the time of application (46 - 48°F) (Table 1). Applications were made at that time to avoid the risk of plants breaking dormancy. The failure of the Gramoxone Max treatments at the second rating is likely a result of late germination of the chickweed. The 3 and 6 oz/A rates of Chateau provided very good control of common chickweed, especially when combined with Gramoxone Max.

Trial 2: Postemergence Weed Control in Established Strawberries

There was no visible sign of crop injury in any of the treatments except the Roundup WeatherMax treatment. Once the plants broke dormancy and started to grow there were obvious vigor differences across the field. The variation could not be blocked by replication or treatment; therefore it was determined that yield data would be of no value and was not taken.

Again, due to the cold temperatures at application, very little weed control was observed at the first rating date (Table 3). By the May 1 rating date, three treatments stood out when evaluating common chickweed control; Roundup WeatherMax, Gramoxone Max and Reflex at 1 pint/A. However, Roundup at 74% crop injury was too injurious to consider as a treatment. Reflex applied at 1 pint/A provided 71% control of common chickweed.

Trial 3: Preemergence Weed Control in Established Strawberries

There was no visible sign of crop injury. However, once the plants broke dormancy and started to grow there were obvious vigor differences across the field. The variation could not be blocked by replication or treatment; therefore it was determined that yield data would be of no value and was not taken.

All of the treatments provided acceptable control of common chickweed and 100% control of henbit (Table 5). Gramoxone, Dual Magnum, Prowl and Spartan resulted in similar control of common chickweed as compared to the standard treatments of Sinbar.

Trial 4: Preemergence Weed Control in Freshly Planted Matted-Row Strawberries

All treatments provided acceptable control or at least suppression of the grass weeds (Table 7). The two most common grass weed species were fall panicum and large crabgrass. However, more suppression may have occurred from the morningglories that were present than from some of the herbicide treatments. Pitted, tall, ivy leaf and entire leaf morningglories were all present in abundance. Only the combination of Prowl and Sinbar applied PPI and Goal applied at 2 pints/A PRE gave acceptable control of the morningglories. All herbicide treatment provided control of the light infestation of prickly sida.

Due to poor survival as a result of dry weather and poor quality plants no crop injury or survival ratings were taken. The few plants that did survive transplanting were choked out by the heavy morningglory pressure. Further testing is needed to evaluate crop injury of the two best treatments.

Conclusions:

Chateau and Reflex appear to have excellent crop safety and good efficacy on established matted-row strawberries. Gramoxone also appears to be a possible tool for use in dormant

strawberries. Dual Magnum, Prowl and Spartan have potential preemergence activity in established matted-row strawberries. A combination of Prowl and Sinbar along with Goal at 3 pints/A may have merit as preemergence weed control options in matted-row strawberries.

Impact Statement:

Data from these trials will be used by registrants and IR-4 to determine the rates and use patterns of “new” weed control products in strawberry production, especially pertaining to matted-row production.

Table 1. Common chickweed control in strawberries receiving Chateau herbicide at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Product	Rate (rate/A)	Common Chickweed (4/04/2005) (%)	Common Chickweed (5/01/05) (%)
UTC	---	0 d ^z	0 f
Chateau WDG COC	2 oz/A 1% v/v	74 ab	49 cd
Chateau WDG COC	3 oz/A 1% v/v	75 ab	41 de
Chateau WDG COC	6 oz/A 1% v/v	86 a	81 abc
Gramoxone Max COC	1 pint/A 1% v/v	89 a	58 abcd
Gramoxone Max COC	1.5 pints/A 1% v/v	80 a	11 ef
Chateau WDG Gramoxone Max COC	2 oz/A 1 pint/A 1% v/v	86 a	51 bcd
Chateau WDG Gramoxone Max COC	3 oz/A 1 pint/A 1% v/v	91 a	91 a
Chateau WDG Gramoxone Max COC	6 oz/A 1 pint/A 1% v/v	93 a	90 a
Chateau WDG Gramoxone Max NIS	2 oz/A 1 pint/A 0.25% v/v	88 a	69 abcd
Chateau WDG Gramoxone Max NIS	3 oz/A 1 pint/A 0.25% v/v	90 a	86 abc
Chateau WDG Gramoxone Max NIS	6 oz/A 1 pint/A 0.25% v/v	86 a	84 abc
Sinbar 80WP	4 oz/A	36 c	83 abc
Stinger	0.33 pints/A	58 b	33 def

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability.

Table 2. Application information for strawberries receiving Chateau herbicide treatments at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Parameter	Measurement
Date of Application	3/15/05
Time of Application	12:30 p.m. - 1:00 p.m.
Pressure	20 psi
Nozzles	XR TeeJet 8003
Gallons per Acre	24
Air Temperature	48°F
Relative Humidity	41%
Cloud Cover	40%
Wind Speed	3 - 5 mph
Wind Direction	from N / NE
Soil Condition	Firm
Soil Temperature @ 4 inches	41.5°F
Soil Moisture	Moist
Variety	'Allstar'

Table 3. Weed control and injury ratings of strawberries receiving postemergence herbicide treatments at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Product	Rate (rate/A)	Common Chickweed Control (4/04/2005) (%)	Common Chickweed Control (5/01/2005) (%)	Mayweed Control (4/04/2005) (%)	Crop Injury Rating (5/01/05) (%)
UTC	---	0 ^z	0 d	0	0 b
Gramoxone Max COC	1 pint/A 1% v/v	24	71 ab	23	0 b
Roundup WeatherMax	2 pints/A	74	100 a	45	74 a
Aim EC COC	1.1 fl oz/A 1% v/v	0	33 bcd	0	0 b
Aim EC COC	2.2 fl oz/A 1% v/v	0	53 abcd	0	0 b
Aim EC COC	6.4 fl oz/A 1% v/v	24	31 bcd	0	0 b
Ultra Blazer COC	1 pint/A 1% v/v	0	54 abcd	23	0 b
Ultra Blazer COC	2 pints/A 1% v/v	25	34 bcd	24	0 b
Goal 2XL COC	1 pint/A 1% v/v	0	40 bcd	0	0 b
Goal 2XL COC	2 pints/A 1% v/v	23	33 bcd	23	0 b
Spartan 4F COC	6 fl oz/A 1% v/v	24	34 bcd	0	0 b
Spartan 4F COC	8 fl oz/A 1% v/v	23	40 bcd	0	0 b
Cobra COC	12 fl oz/A 1% v/v	0	13 cd	0	0 b
Cobra COC	1 pint/A 1% v/v	44	58 abc	36	0 b
Reflex COC	1 pint/A 1% v/v	0	71 ab	23	0 b
Reflex COC	2 pints/A 1% v/v	23	64 ab	13	0 b

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability. Absence of letters indicates no significant difference at the 0.05 level of probability.

Table 4. Application information for strawberries receiving postemergence herbicide treatments at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Parameter	Measurement
Date of Application	3/15/05
Time of Application	1:55 p.m. - 2:25 p.m.
Pressure	20 psi
Nozzles	XR TeeJet 8003
Gallons per Acre	24
Air Temperature	46°F
Relative Humidity	35%
Cloud Cover	95%
Wind Speed	6 - 7 mph
Wind Direction	from N / NE
Soil Condition	Firm
Soil Temperature @ 4 inches	43.5°F
Soil Moisture	Moist
Variety	'Allstar'

Table 5. Weed control ratings in strawberries receiving preemergence herbicide treatments at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Product	Rate (rate/A)	Common Chickweed Control (4/04/2005) (%)	Common Chickweed Control (5/01/2005) (%)	Henbit Control (4/04/2005) (%)
UTC	---	0 c ^z	0 c	0 b
Gramoxone Max COC	1 pint/A 1% v/v	98 ab	85 ab	100 a
Dual Magnum Gramoxone Max COC	1 pint/A 1 pint/A 1% v/v	100 a	88 ab	100 a
Dual Magnum Gramoxone Max COC	1.5 pints/A 1 pint/A 1% v/v	95 ab	85 ab	100 a
Prowl 3.3EC Gramoxone Max COC	1 pint/A 1 pint/A 1% v/v	94 ab	85 ab	100 a
Prowl 3.3EC Gramoxone Max COC	2 pints/A 1 pint/A 1% v/v	100 a	89 ab	100 a
Spartan 4F Gramoxone Max COC	6 fl oz/A 1 pint/A 1% v/v	95 ab	83 ab	100 a
Spartan 4F Gramoxone Max COC	8 fl oz/A 1 pint/A 1% v/v	89 ab	69 b	100 a
Sinbar 80W	4 oz/A	85 b	98 a	100 a
Sinbar 80W	6 oz/A	89 ab	96 a	100 a

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability.

Table 6. Application information for strawberries receiving postemergence herbicide treatments at Bradley Kountry Acres, Cottontown, Sumner Co., TN, 2005.

Parameter	Measurement
Date of Application	3/15/05
Time of Application	3:00 p.m. - 3:15 p.m.
Pressure	20 psi
Nozzles	XR TeeJet 8003
Gallons per Acre	24
Air Temperature	47°F
Relative Humidity	41%
Cloud Cover	95%
Wind Speed	2 - 5 mph
Wind Direction	from N / NE
Soil Condition	Firm
Soil Temperature @ 4 inches	42.4°F
Soil Moisture	Moist
Variety	'Allstar'

Table 7. Weed control ratings in strawberries receiving PPI and PRE herbicide treatments at Mann Farms, Fort Blackmore, Scott Co., VA, 2005.

Product	Rate (rate/A)	Time of Application	Grass Weed Control (7/11/2005) (%)	Morningglory <i>sp.</i> Control (7/11/2005) (%)	Prickly Sida Control (7/11/2005) (%)
UTC	---	---	0 e ^z	0 c	0 b
Prowl 3.3EC Sinbar 80W	2 pints/A 4 oz/A	PPI PPI	100 a	89 a	100 a
Ultra Blazer	1 pint/A	PRE	85 bcd	39 abc	100 a
Ultra Blazer	2 pints/A	PRE	80 d	15 bc	100 a
Goal 2XL	1 pint/A	PRE	93 abcd	54 ab	100 a
Goal 2XL	2 pints/A	PRE	95 abc	88 a	100 a
Spartan 4F	6 fl oz/A	PRE	83 cd	54 ab	100 a
Spartan 4F	8 fl oz/A	PRE	93 abcd	40 abc	100 a
Spartan 4F	10 fl oz/A	PRE	98 ab	60 ab	100 a
Prowl 3.3EC	1 pint/A	PRE	93 abcd	21 cd	100 a
Prowl 3.3EC	2 pints/A	PRE	88 abcd	53 ab	100 a
Prowl 3.3EC	3 pints/A	PRE	100 a	50 abc	100 a
Dual Magnum	1 pint/A	PRE	90 abcd	50 abc	100 a
Dual Magnum	1.5 pints/A	PRE	95 abc	50 abc	100 a
Sinbar 80W	4 oz/A	PRE	95 abc	20 bc	100 a
Sinbar 80W	6 oz/A	PRE	100 a	31 bc	100 a

^z Means within a column followed by the same letter are not significantly different at the 0.05 level of probability.

Table 8. Application information for strawberries receiving PPI and PRE herbicide treatments at Mann Farms, Fort Blackmore, Scott Co., VA, 2005.

Parameter	PPI	PRE
Date of Application	6/08/05	6/08/05
Time of Application	1:35 p.m.	2:35 p.m. - 3:15 p.m.
Pressure	20 psi	20 psi
Nozzles	XR TeeJet 8003	XR TeeJet 8003
Gallons per Acre	21	21
Air Temperature	87°F	86°F
Relative Humidity	60%	63%
Cloud Cover	60%	40%
Wind Speed	2 mph	<2 mph
Wind Direction	West	West
Soil Condition	Freshly Tilled	Freshly Tilled
Soil Temperature @ 4 inches	76°F	78°F
Soil Moisture	Dry	Dry
Variety	'Latestar'	'Latestar'