

Update on Weed Control in Peppers



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Weed Control Materials Registered for Peppers in California

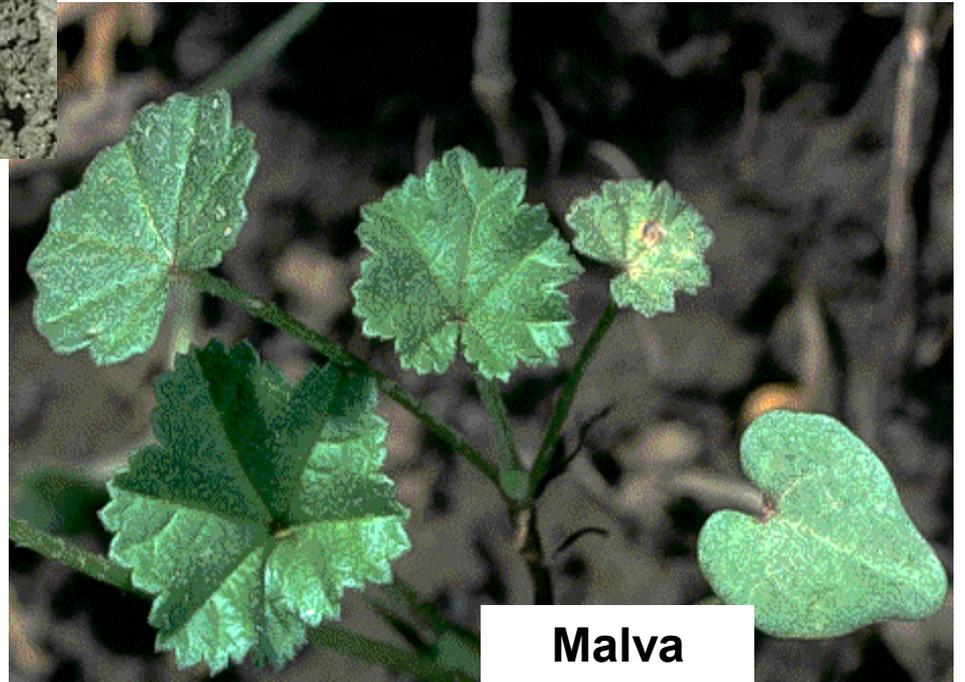
- **Preplant**
 - Paraquat
 - Roundup
 - Metam Sodium
- **Preemergence**
 - Goal^{1,2}
 - Prefar
 - Devrinol
 - Treflan
 - Dual Magnum
 - Prowl H2O
- **Layby**
 - Dacthal
 - Dual Magnum
 - Prowl H2O
- **Postemergence**
 - Paraquat³
 - Sandea
 - Poast
 - Select Max
 - Chateau⁴
 - Suppress⁵

1-Preformed beds up to 30 days prior to transplanting, must work beds; 2-applied to shaped beds and tarped
3-shielded application; 4-to furrow bottoms only
5-Organic

Difficult Weeds to Control



Hairy Nightshade



Malva

Pepper Herbicides

WEEDS	Prefar	Dacthal	Dual Magnum	Devrinol	Prowl H2O	Treflan
CHICKWEED	P	C	C	C	C	C
N.L. GOOSE FOOT	P	C	P	C	C	C
GROUNDSEL	N	N	N	C	N	N
HENBIT	N	P	-	N	C	C
LAMBS QUARTERS	C	C	P	C	C	C
MALVA	N	P	P	P	P	N
BURNING NETTLE	P	P	C	P	N	N
BLACK NIGHTSHADE	N	P	C	N	N	N
HAIRY NIGHTSHADE	N	P	C	N	N	N
YELLOW NUTSEGE	N	N	P	N	N	N
PIGWEEED	C	C	C	C	C	C
PURSLANE	C	C	C	C	C	C
SHEPERD'S PURSE	N	N	P	P	P	N
SOW THISTLE	N	P	P	C	N	N

Recent Milestones in Pepper Weed Control

Cultural Practices

- Drip irrigation
- Plastic mulch
- Use of hybrid seed
- Use of transplants
- Water management?

Herbicides

- Dual Magnum
- Prowl H₂O
- Goal Tender under plastic
- Chateau furrow bottoms

New Herbicide Options

- **Zidua (pyroxasulfone) from K-I USA/Kumiai**
- **Inhibitor of long-chain fatty acid (similar mode of action to Dual Magnum)**
- **Registered for use on corn, cotton & soybeans**
- **Particularly effective against herbicide resistant pigweed back east**

2016 Red Bell Pepper Trial

Treatment	Application	Material/A	Night-Shade May 26
Untreated	---	---	106.3
Dual Magnum	Post	1.6 pt	2.3
Zidua	Pre	0.5 oz	53.7
Zidua	Pre	1.0 oz	14.0
Zidua	Pre	2.0 oz	13.0
Zidua	Post	1.0 oz	0.0

2016 Red Bell Pepper Trial

Treatment	Application	Material/A	Weed time hrs/A
Untreated	---	---	28.6
Dual Magnum	Post	1.6 pt	6.9
Zidua	Pre	0.5 oz	19.5
Zidua	Pre	1.0 oz	10.5
Zidua	Pre	2.0 oz	10.4
Zidua	Post	1.0 oz	5.1

2016 Red Bell Pepper Trial

Treatment	Application	Material/A	Yield tons/A
Untreated	---	---	55.8
Dual Magnum	Post	1.6 pt	56.7
Zidua	Pre	0.5 oz	57.4
Zidua	Pre	1.0 oz	49.8
Zidua	Pre	2.0 oz	47.4
Zidua	Post	1.0 oz	49.1



Untreated



Zidua 0.5 oz



Zidua 2.0 oz

2017 Ancho Pepper Trial

Treatment	Application	Material/A	Total weeds* No/3 ft²
Untreated	---	---	50.8
Dual Magnum	Post	1.6 pt	16.8
Zidua	Pre	0.5 oz	28.8
Zidua	Pre	1.0 oz	14.0
Zidua	Pre	2.0 oz	10.3
Zidua	Post	1.0 oz	22.0
Zidua	Post	2.0 oz	9.5

* Groundsel, shepherd's purse, nightshade, sow thistle and lambsquarter

2017 Ancho Pepper Trial

Treatment	Application	Material/A	Yield tons/A
Untreated	---	---	15.9
Dual Magnum	Post	1.6 pt	21.2
Zidua	Pre	0.5 oz	17.0
Zidua	Pre	1.0 oz	15.7
Zidua	Pre	2.0 oz	10.5
Zidua	Post	1.0 oz	16.8
Zidua	Post	2.0 oz	16.3



Untreated



Zidua 0.5 oz



Zidua 2.0 oz



**Zidua 2.0 oz
Post**



Groundsel

Auto Weeders for Use in Pepper Production

- Auto weeders now available for use in vegetable crop production:
 - Garford, Quinn Tractor
 - Robovator, Pacific Ag Rentals
 - Steketee, Sutton Ag



Effectiveness of Autoweeders

- **Ideal for transplanted crops**
- **Learning curve for adjusting the machine to take out weeds and safeguard the crop**
- **Blades can be adjusted to reach under the crop**
- **Work best with low/moderate weed populations**



Island of undisturbed soil



Island is left around the plant; this undisturbed area can be adjusted to be more or less aggressive

Evaluations of Automated Weeders with Blades

Affect on crop and weeds

Summary of Four Trials

Pre vs Post weeding	Lettuce plants 1000/A	No. of Weeds 1000/A
Pre weeding	37.3	13.5
Post weeding	35.2*	6.6

Removed about 50% of the weeds in the seedline

* Can be adjusted



Weeds butting against the plant are not removed

Evaluations of Automated Weeders with Blades

Affect on subsequent hand weeding

Treatment	Hand Weed Hrs/A
Mechanical weeder	6.1
No mechanical weeder	9.7

Reduced time of subsequent hand weeding by 35%



Spray Kill Mechanism

- Blue River Technology's Seek & Spray automated weeder that uses a dot matrix spray mechanism provide precision
- They are currently building several production machines to pursue the cotton market
 - Simpler system with one crop and mostly one weed species
- They have mentioned plans to bring the machine to the coastal vegetable market at some point in the future

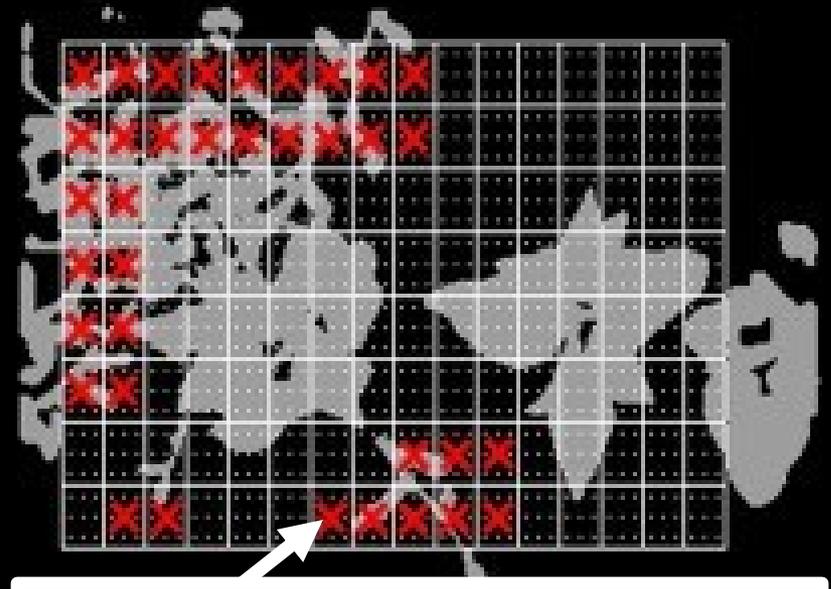


“dot matrix” type sprayer:
note blocky spray pattern

Machine Vision Spot Spray Mapping of Morning Glory in Beans



Original Image



Map showing $\frac{1}{2}$ " by $\frac{3}{8}$ " Microjet spray cells

Cells with a red X are mapped to be sprayed.

Micro-Jet Application Results

- Field results:
89% of weeds
sprayed,
- 79% of cotton
plants not sprayed.



Selective Spray Material for use with Autoweeder with Spray Kill Mechanism

- Peppers have a selective post emergent option that can be used to kill weeds and provide safety to the crop – Sandea**
- This concept has not been tested, but it should be looked at in the event the Seek & Spray weeder becomes available for use on this crop**