

**EFFICACY OF DRIP AND SHANK
APPLIED MIDAS™ FOR STRAWBERRY
PRODUCTION IN CALIFORNIA**

**Husein Ajwa*, Shachar Shem-Tov,
and Steve Fennimore**

University of California-Davis,

MIDAS™

- Is a mixture of iodomethane (IM) plus chloropicrin (Cp).
- USEPA Registration No. 66330-57 (Arysta Lifescience).
- Three Midas formulations:
IM:Cp mixtures: 98:2, 50:50, & 33:67.

Properties of Soil Fumigants

Fumigant	Molecular Weight	Density at 20°C	Boiling point	Vapor pressure at 20°C	Solubility in water at 20°C
	g/mol	g/cc	°C	mm Hg	%w/w
MethylBr	95	1.75	4	1420	1.34
Iodomethane	142	2.28	42	400	1.40
Chloropicrin	164	1.66	112	18	0.20

Properties of Soil Fumigants

Fumigant	Air/Water Distribution	Soil adsorption	Half-life in soil
	(K_H)	(K_d)	days
Methyl -Br	0.244	0.07- 0.10	22
Iodomethane	0.210	0.09- 0.16	4⁺
Chloropicrin	0.093	0.14- 0.31	1⁺

Bed Shank Injection



Drip Fumigation



Methods and Experiment Design

- **Strawberry production fields: Watsonville and Salinas, CA.**
- **Treatments:**
 - **Untreated control**
 - **200 or 300 lbs/A MbCp (67:33)**
 - **200 lbs/A Midas**
- **Two formulations of Midas (33:67 and 50:50) were applied by drip fumigation and shank injection.**

Methods

- **Beds were covered with clear 1.38 mil VIF mulch (BromoStop™ Rimini Italy) during bed shank application or before drip application.**
- **Shank Injection: Midas was injected through 2 shanks into raised beds.**
- **Drip Fumigation: Midas EC was applied in 1.75 inches of irrigation water via 2 drip tapes.**

Methods

- **Strawberry transplants (var. Diamante) were planted four weeks after fumigation.**
- **Strawberry fruit was harvested weekly and graded into fresh market and culls.**
- **Cultural practices by growers.**

Methods

- **In-season weed control was evaluated by counting weeds from the 24" bed top prior to each hand removal practice.**
- **Only in year 1, nylon mesh bags containing weed seeds were buried in the soil at 2" and 6" in the center and at the edge of the bed.**
- **Seed bags included seeds of common chickweed, common purslane, little mallow and common knotweed.**
- **Post fumigation seed viability was determined by tetrazolium staining.**

Weed Seed Control in Watsonville

Treatment	Little mallow	Common purslane	Common chickweed	Common knotweed
	----- Seed viability (%) -----			
Control	80.5 a	95.8 a	77.7 a	91.5 a
Mb:Cp	66.0 b	0.6 b	0.8 b	12.8 a
Midas 33 drip	58.9 b	2.1 b	0.0 b	0.5 b
Midas 50 drip	64.6 b	0.0 b	0.0 b	0.0 b
Midas 33 shank	56.7 c	7.7 b	0.0 b	0.0 b
Midas 50 shank	58.0 c	0.0 b	0.0 b	0.0 b
ANOVA				
P- value	<0.001	<0.001	<0.001	<0.001

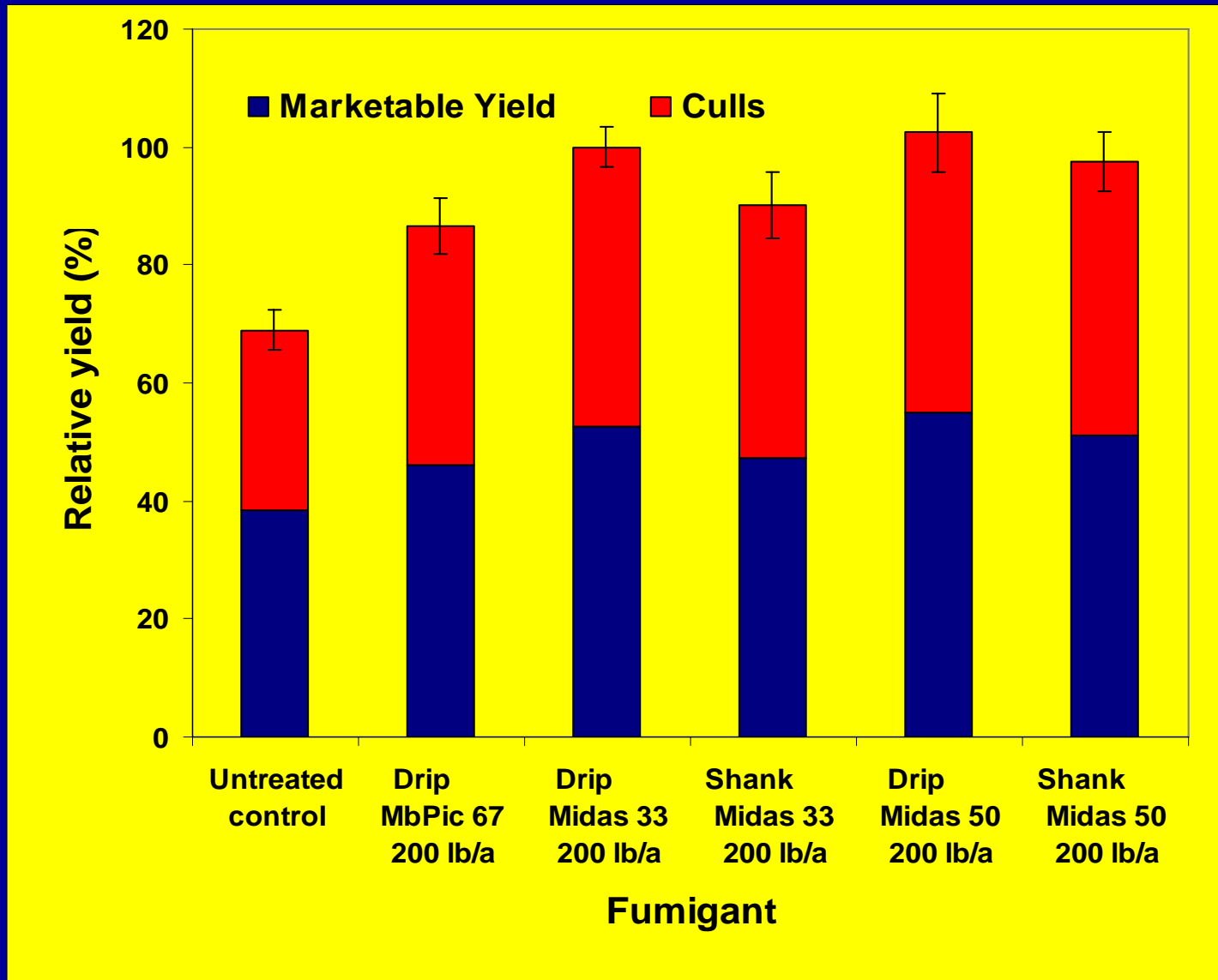
Weed Seed Control in Salinas

Treatment	Little mallow	Common purslane	Common chickweed	Common knotweed
	----- Seed viability (%) -----			
Control	74.8 a	97.4 a	82.7 a	99.0 a
Mb:Cp	56.2 b	0.0 b	0.0 b	3.2 b
Midas 33 drip	52.6 b	1.6 b	0.0 b	0.0 b
Midas 33 shank	54.9 b	0.0 b	0.0 b	0.0 b
Midas 50 shank	53.0 b	0.0 b	0.0 b	0.0 b
ANOVA				
P- value	<0.0001	<0.0001	<0.0001	<0.0001

In-Season Weed Control

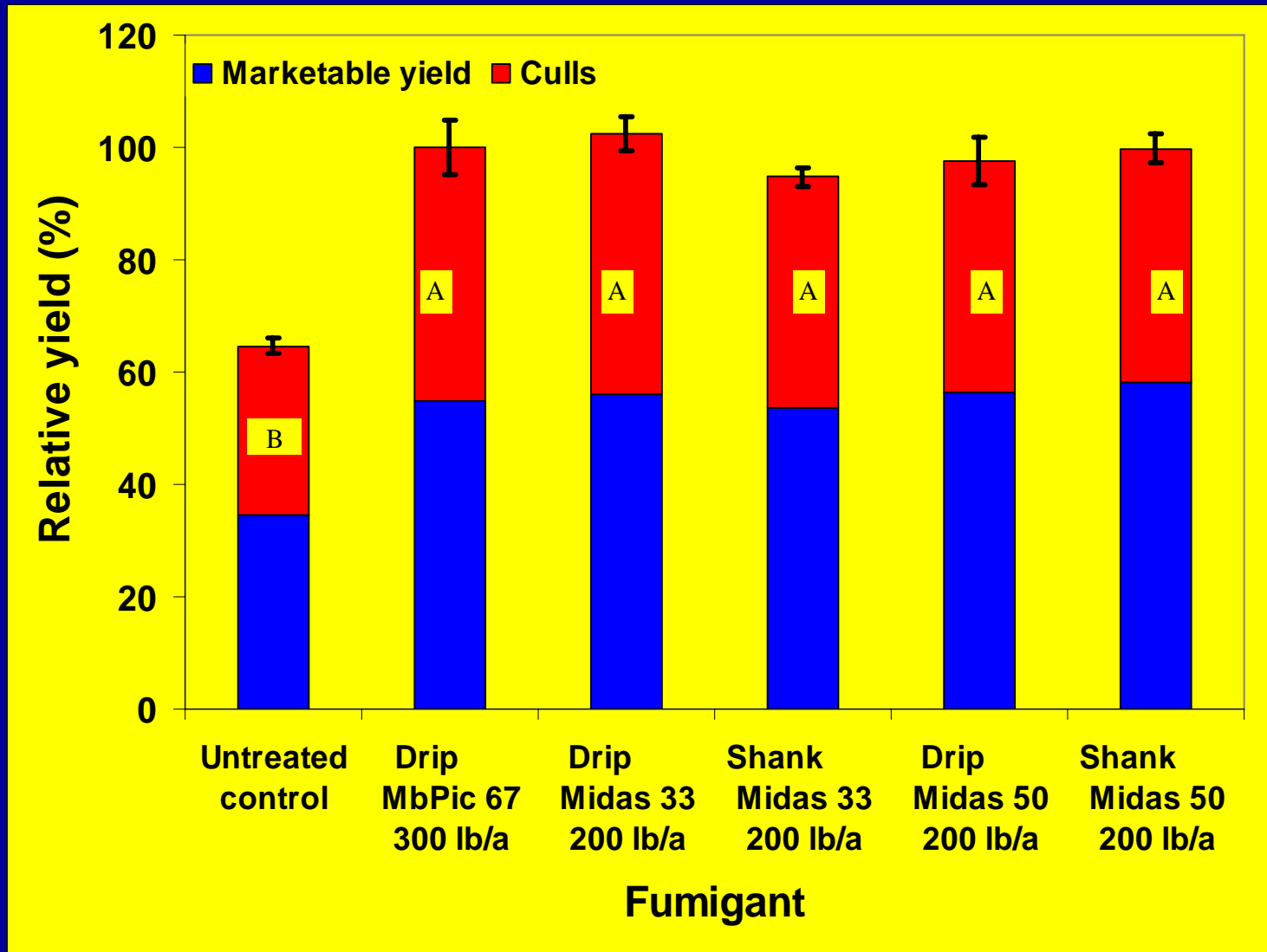
Fumigant (200 lb/A)	Watsonville 2005	Salinas 2005	Watsonville 2006	Salinas 2006
	-----Weed control (%)-----			
Control (Weeds/A)	0 (1,024,832)	0 (113,643)	0 (106,636)	0 (62,273)
Mb:Cp	95	83	94	84
Midas 33 drip	94	48	92	87
Midas 50 drip	98	78	96	Not tested
Midas 33 shank	83	81	94	87
Midas 50 shank	83	60	94	79
ANOVA				
P- value	0.004	0.022	<0.0001	0.001

Strawberry Yield, Watsonville 2005



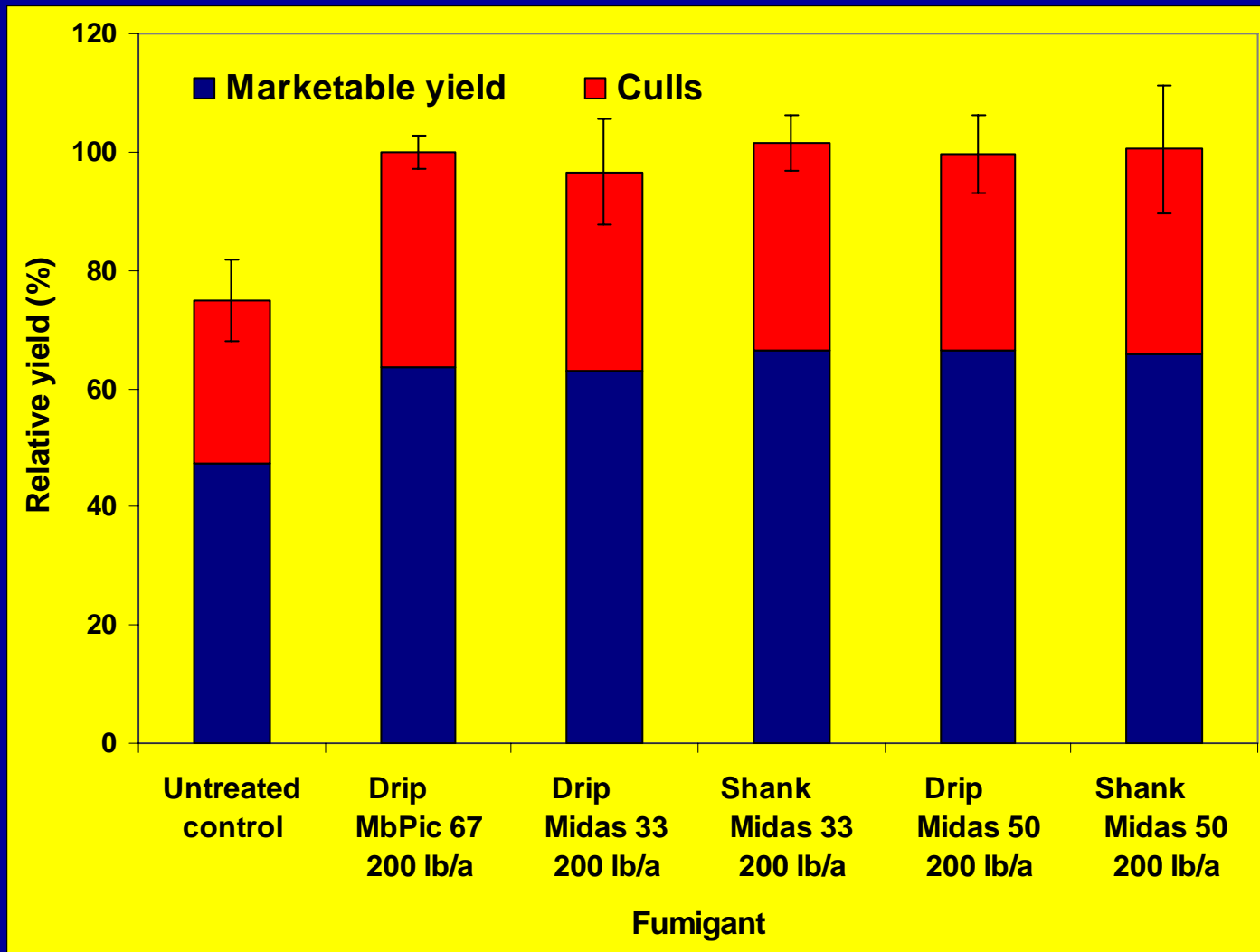
100% yield was 50,231 lb/A

Strawberry Yield, Watsonville 2006



100% yield was 50,551 lb/A

Strawberry Yield, Salinas 2005



100% yield was 41,637 lb/A

Conclusions

- **Pest control efficacy and yields in plots treated with Midas formulations (both 33:67 and 50:50) were similar to plots treated with MbCp.**
- **Midas can be applied through shank or drip fumigation.**
- **Midas 33:67 seems to work better for drip application while the Midas 50:50 seems to work better for shank applications.**

SUMMARY

- **Iodomethane has similar properties to methyl bromide.**
- **Iodomethane is more effective than Mb in controlling soilborne pathogens and weeds – apply less material.**
- **Iodomethane has a shorter half-life than Mb – photo reactive and degrades in hours when exposed to light.**
- **Safer to handle - liquid under common application conditions.**

Thank you very much

Acknowledgements:

California Strawberry Commission

Arysta LifeScience

Bruno Rimini

TriCal