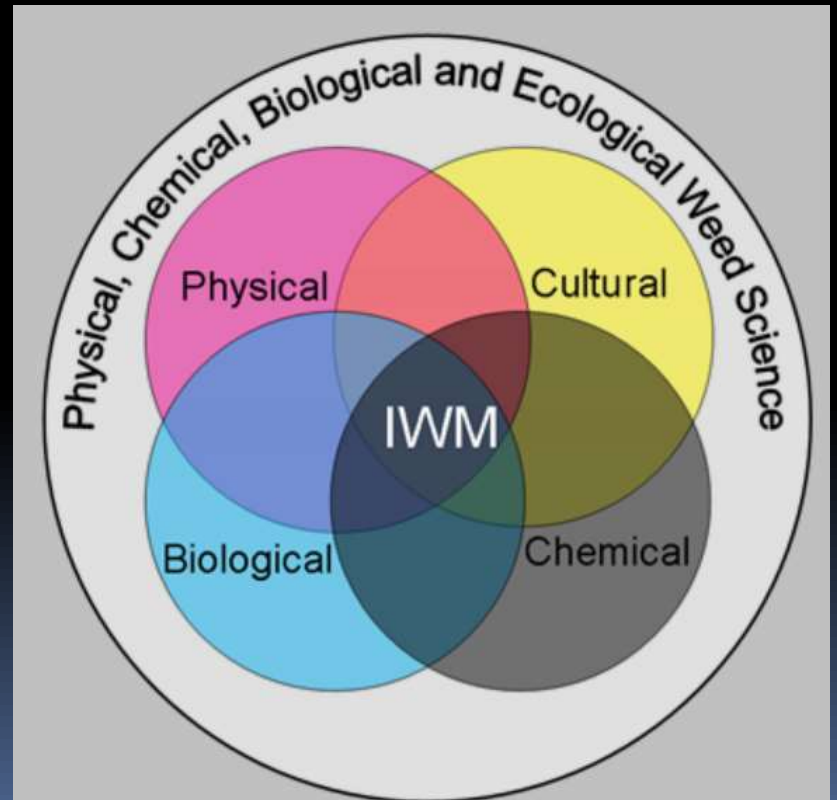


MECHANICAL, BIOLOGICAL AND CHEMICAL STRATEGIES



Disclaimer



Please take note....not all herbicides or uses discussed in this presentation are registered.

- ❖ **Cultural Practices: stale seedbeds**
 - Herbicide screening in vegetable crops
- ❖ **Chemical Control: Project updates**
 - Herbicide screening in vegetable crops
 - Reflex on cucurbits for seed
 - Outlook on transplanted radish
- ❖ **Trending: Physical and Mechanical Weed Control Strategies**

I. Cultural Practices

STALE SEEDBEDS

Herbicide Screening in Vegetable Crops

2015, NWREC



Methods

33 herbicide treatments

30 vegetable crops

3 replications

2 flea beetle sprays

0 cabbage maggot sprays

not enough irrigation

2 field days

16 Brassica veggies (Brassicaceae):

Arugula, Bok Choi, Broccoli raab, Ch. Cabbage, Collard, mustard spinach, Kale, Mustard greens, Turnip top greens, Broccoli, Cabbage, Cauliflower, Radish, Rutabaga, Kohlrabi, Turnip

4 Sunflower family (Asteraceae): Lettuce (Leaf and head), chicory, endive

4 Carrot family (Apiaceae): carrot, cilantro, celeriac, parsnip

2 Cucurbits (Cucurbitaceae): zucchini and cucumber

3 Beet family (Chenopodiaceae): spinach, chard, beets

4 Onions (Alliaceae): green, bulb, chives, leeks

4 Seed crops: Alyssum, Bachelor button, Poppy, Phacelia (borage)

Stale Seed-bed with Organic Potential

Treatment	Herbicide	Conc.
Caparylic and capric acids	Suppress	3 and 6%
d-Limonene	Nature's Avenger	10 and 20%
Acetic acid	Weed Pharm (20%) non crop, not org.	50 and 100%

What we learned: Stale seedbeds

Herbicide		Timing	Rate	Pig weed	Hairy Night shade	Lambs-quarters	Shepherd's purse	Composite rating
<i>lb ai / A</i>				<i>-----% control-----</i>				
Suppress	Caprylic+ Capric acid	EPOST	3%	37	27	0	33	37
		LPOST	6%	3	3	3	3	3
Weed Pharm	Acetic acid, 20%	EPOST	50%	10	0	0	0	0
		LPOST	100%	0	0	0	0	0
Nature's Avenger	d limonene	EPOST	10%	0	0	0	0	0
		LPOST	20%	0	0	0	0	3

SUPPRESS[®]

HERBICIDE EC



FOR ORGANIC PRODUCTION

**A Contact, Post-Emergent
Non-Selective Herbicide
for Use in Agricultural
Food and Non-Food Crops**

Active Ingredients:
Caprylic Acid..... 47%
Capric Acid..... 32%
Other Ingredients:..... 21%
Total..... 100%

KEEP OUT OF REACH OF CHILDREN WARNING/AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

See inside booklet for First Aid and Precautionary Statements

SHAKE WELL BEFORE USING • APPLY WITH CONTINUOUS AGITATION

Manufactured by:
 **Westbridge**
Agricultural Products
1260 Avenida Chelsea
Vista, CA 92081 USA
(800) 876-2767

EPA Reg. No. 51517-9
EPA Est. No. 51517-CA-1





OMRI Listed®

The following product is OMRI Listed. It may be used in certified organic production or food processing and handling according to the USDA National Organic Program Rule.

Product

SUPPRESS® Herbicide EC

Company

Westbridge

Dr. Larry Parker

1260 Avenida Chelsea

Vista, CA 92081

Vinagreen

A Horticultural Vinegar Biopesticide - for Non-Selective Control of Herbaceous Broadleaf Weeds and Weed Grasses which Surround Food crops, Non-food crops and Non-production Agricultural, Farmstead, Right-of-Way, and Institutional Land Sites

For Organic Production

Active Ingredient:	
Acetic Acid	20.0%*
Other Ingredients	80.0%
Total	100.0%

*Equivalent to 200 grain vinegar by titration

KEEP OUT OF REACH OF CHILDREN
DANGER - PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

See label side panels for additional precautionary statements.



Why stale seed beds?

- ❖ Essential in minor crops with few herbicide options
- ❖ Glyphosate cannot be used postplant in many crops

Stale seed bed herbicides

Aim

Paraquat

Roundup

- Limitations on cucurbits, leafy and fruiting vegetables (tomato)

Flame weeding


Contact organics

Labeled uses of Roundup in vegetable crops (from Weed Handbook)

Labeled ('L') Uses of Glyphosate In Vegetable

Vegetable crops (see key)	Chemical fallow	Preplant fallow beds	Preplant	Before transplanting vegetables	At planting	After planting but before crop emergence	Hooded sprayers in row middle
Brassica vegetables ^a	L	L	L	L	L	L	L
Bulb vegetables ^b	L	L	L	L	L	L	L
Cucurbit vegetables and fruit ^c	L	L	Allow 3 days between application and planting for Cantaloupe, Casaba, Crenshaw, Cucumbar, Gherkin, Gourds, Honeydew, Honey bell, Mango melons, Melons (all), Muskmelon, Persian Melon, Pumpkin, Squash (winter and summer) and Watermelon	L	Touchdown HiTech only postplant	Touchdown HiTech only postplant	L
Leafy vegetables ^d	L	L	Allow 3 days between application and planting Watercress	Excapt watercress	Excapt watercress	-	L
Fruiting vegetables ^e	L	L	Allow 3 days between application and planting for Eggplant, Ground cherry, Papino, Pepper (bell, chili, cooking, pimento, sweet)	If more than 3 days until transplanting	-	-	Tomato: not recommended
Legume vegetables ^f	L	L	L	L	L	L	L
Root and tuber vegetables ^g	L	L	L	L	L	L	L

vest/
ions

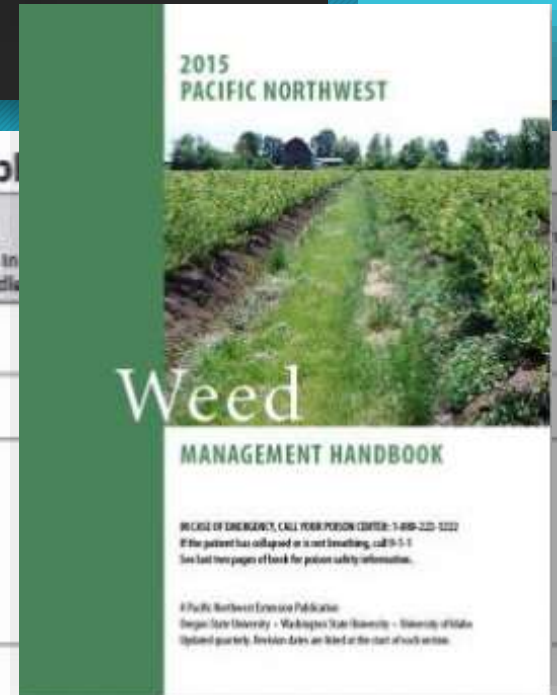


Weed

MANAGEMENT HANDBOOK

IN CASE OF EMERGENCY, CALL YOUR POISON CENTER: 1-800-222-1222
If the patient has collapsed or is not breathing, call 9-1-1.
See last two pages of book for poison safety information.

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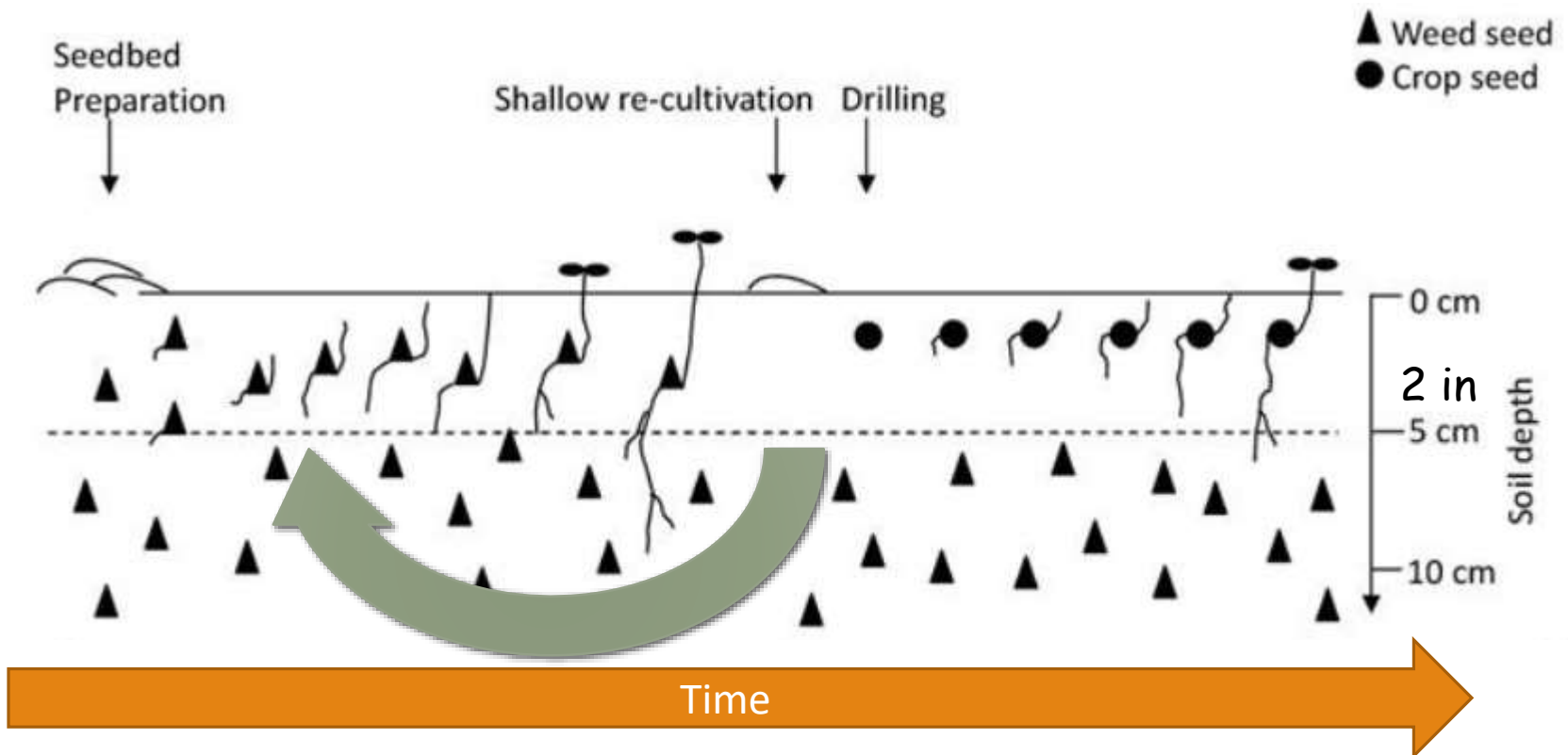


Labeled uses of Roundup in vegetable crops (from Weed Handbook)

Vegetable crops (see key)	Chemical	Preplant fallow		Before transplanting	At	After planting but before crop emergence
Cucurbit vegetables and fruit *	3 days before planting: Cucurbits Leafy vegetables Fruiting vegetables					Touchdown HiTech only postplant
Leafy vegetables *						-
Fruiting vegetables *						-

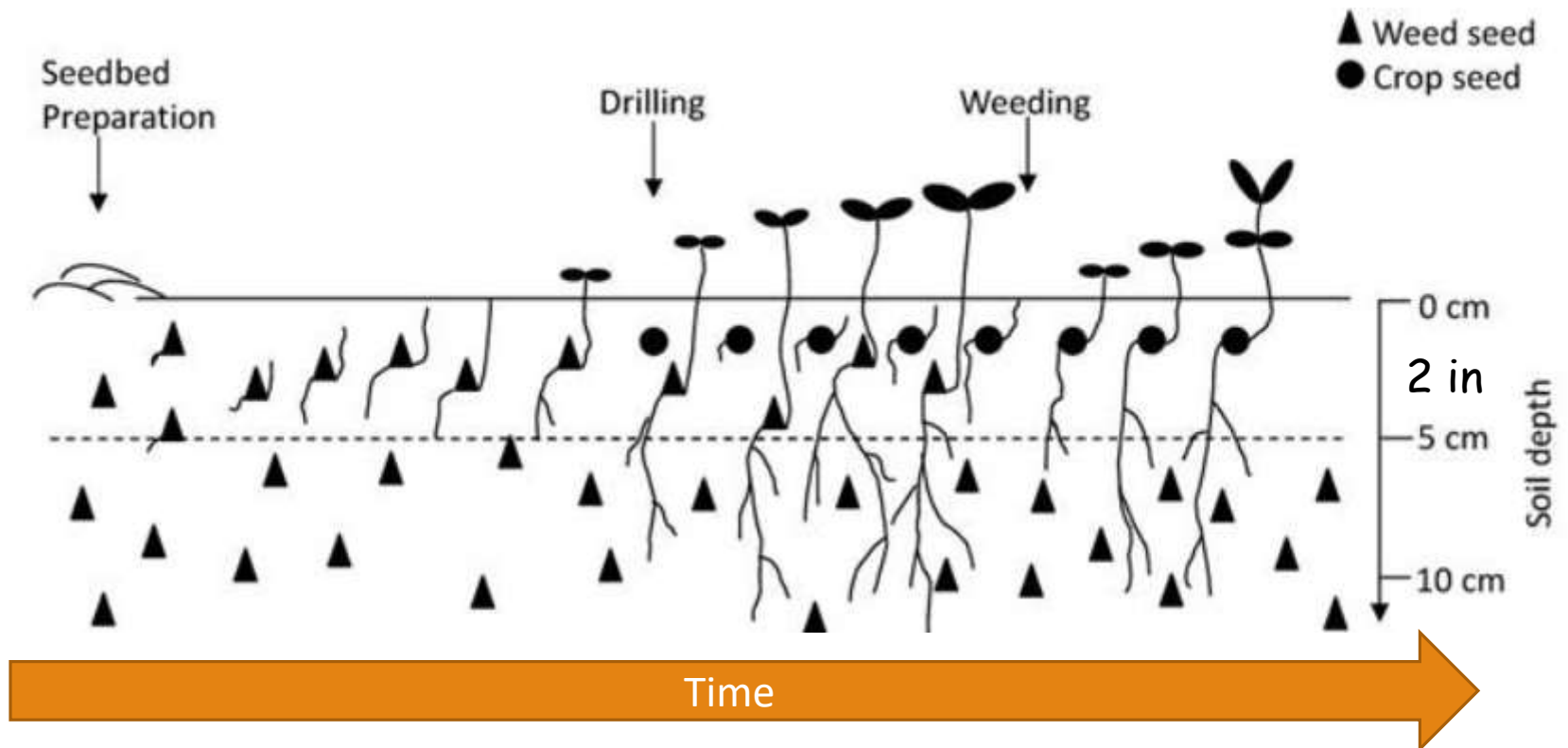
False seedbeds

Cultivation, flaming, herbicides



Stale seedbeds

Flaming, herbicides



Why false/stale seedbeds work

1. Most weed seeds are dormant

Only 5 to 10 % germinate at a time

Estimated 38% germination in the top 2 in of soil!



06/08/2003

Why false/stale seedbeds work

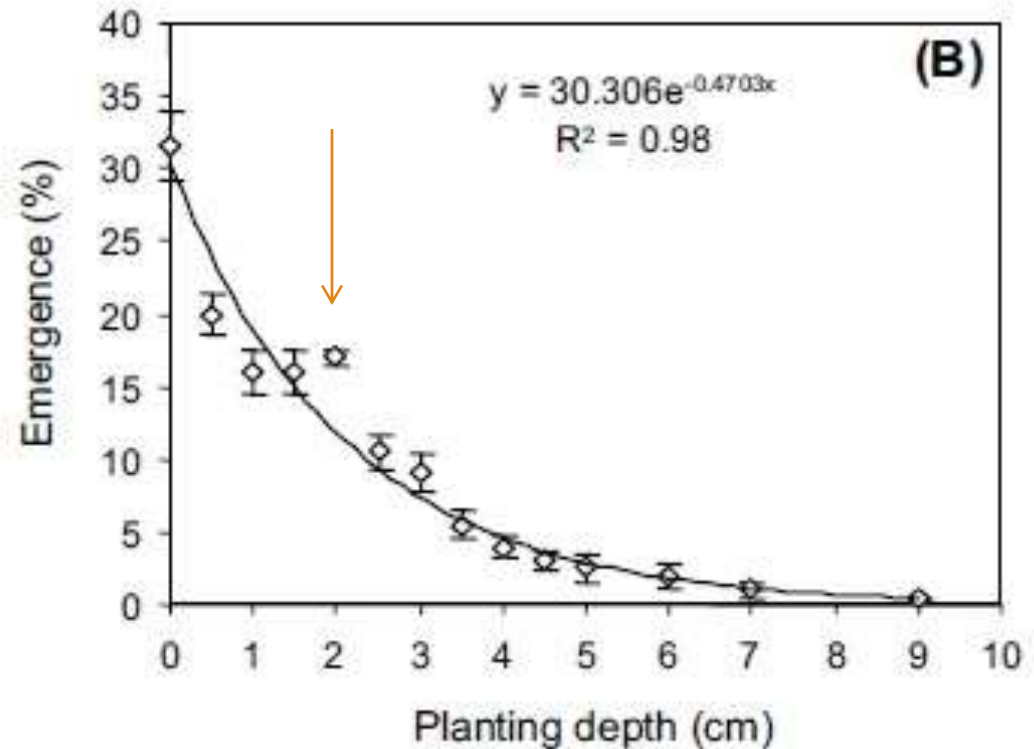
2. Tillage is the most effective means of germinating weed seeds



Why false/stale seedbeds work

3. Most weeds only emerge from the top $\frac{3}{4}$ in of soil.

Barnyardgrass (Sadeghloo et al 2013)



Why false/stale seedbeds work

4. Work best if seed density is low

- 10000 to 30000 seeds per m sq is not unusual
- How many seeds can I add to the soil each year?



Roller under-cutter



Rod weeder



Flaming onions





Row flamer



The downside

- ❖ Impeded by wet springs
- ❖ Weed phenology and crop phenology are not synchronized
- ❖ Symphylans

II. Chemical control

Acuron

Syngenta
Corn only

Dual Magnum
Atrazine
Callisto (HPPD)
Bicyclopyrone (HPPD)

8
Acuron
POST
2 qt.



New HHPD herbicides

Bicyclopyrone (Syngenta)

Tolpyralate (ISK)

Soil residual HPPD herbicides

Selectivity in onions, carrots, others?



12
Tolpyralate
POST
1 oz



Alyssum

B button

Poppy

Phacelia

Brassicaceae, Asteraceae, Papaveracea, Boraginaceae





Expanding uses
of Reflex



Potential use of Reflex in other cucurbits



Carryover Concerns



Brassica (cabbage), Corn, Wheat (4 months)

Crop response at 12 months (2013)

CROP INJURY FROM REFLEX CARRYOVER (2014) 5 MONTHS AFTER APPLICATION

Reflex applied May, 2014; Follow crops planted Oct 10, 2014



Ann ryegrass



Bentgrass

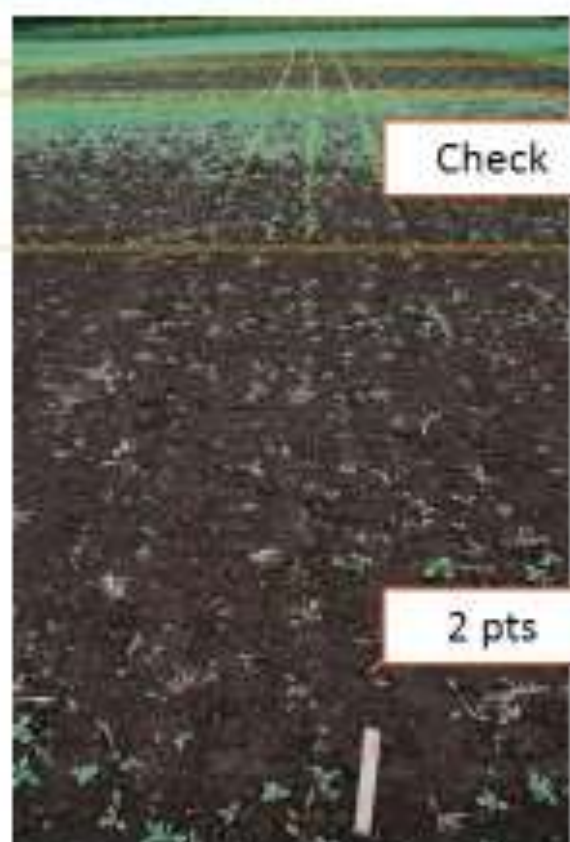


Table beets

Trending

Is a new 'mode of
action' warranted?

-
- ❖ Consolidation of registrants (DowPont)
 - ❖ Resistant (glyphosate) weed species in the Midwest
 - ❖ Cost of labor
 - ❖ Demand for organic



Hagie Cover Crop Interseeder (CCI) heads to the field for a seeding demonstration.

Photo credit: James DeDecker, MSU Extension

Can interseeding/ relay planting
improve control of herbicide
resistant species?



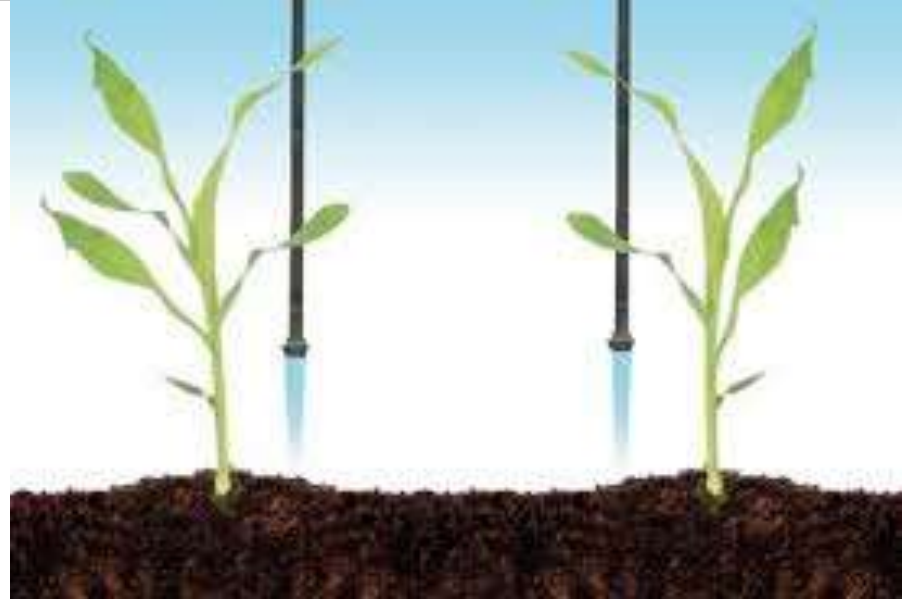
Ag Progress Days, PSU

Corey Dillon





High clearance notill drill
7.5 in row spacing,
Removed one of four openers





Weed control machines

The Bourquin Organic Weed Puller

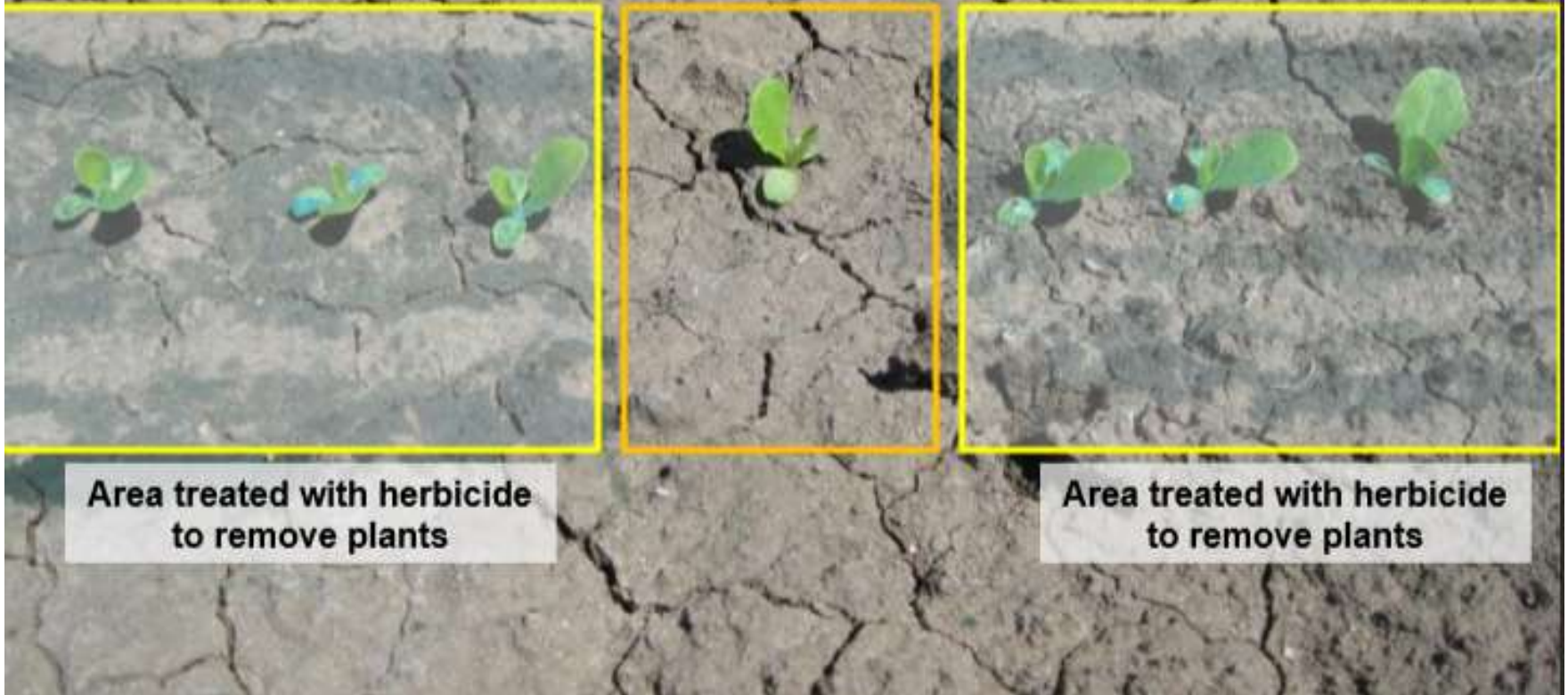


Precision spray systems



Pictures courtesy of Richard Smith, UC Davis

Pictures courtesy of Richard Smith, UC Davis



**Area treated with herbicide
to remove plants**

**Area treated with herbicide
to remove plants**

Broadcast soil heating to kill weeds and pests



Stockholmsgården
Skania
Sweden



MVI_2595.wmv

Band steaming in the row



2000 KW bed steamer with 13 tines

Robotics



weedmaster

weed robot concept



Robotics



The IAW is a four-wheel steered and four-wheel driven autonomous platform



WAGENINGEN UNIVERSITY
WAGENINGEN UR

TYKER TECHNOLOGY





Robotic Steamer

6 minute stops
2.5 inch soil sterilization



Information access

Oregonvegetables.com

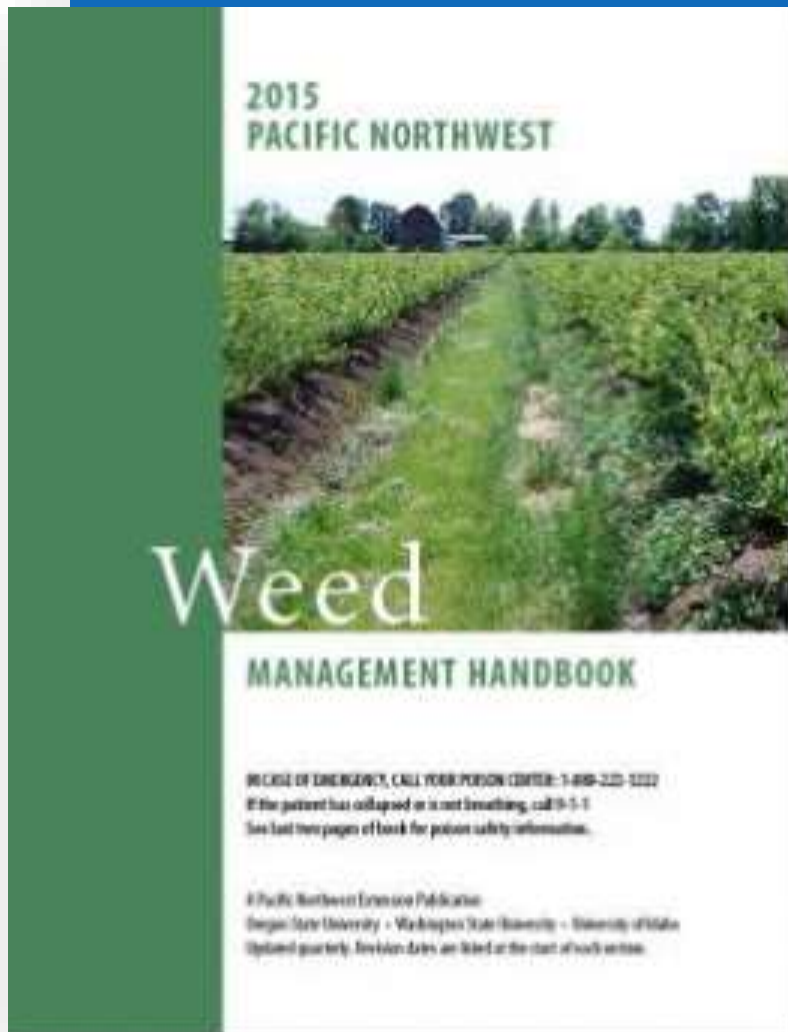
My Web site: Hort Department

Linn County: commercial
vegetables

Handbook



<http://pnwhandbooks.org/weed/>



Comments of Questions?

2/6/2020