Great Plains
Vegetable Growers Conference

January 13, 2016

Tomato Disease Management: What Worked & What Did Not Work!

Dennis Hatfield
Pierce City, Missouri

Session Outline

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1st Session: 1:30 - 2:00 pm

- Root fungus—Southern Blight
- Bacterial Canker
- Early Blight (Alternaria)
- Septoria Leaf Spot
- Spray Plan & Fungicides Applied
- Spraying Principles Recap
- Spraying Record Forms for Growers

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2nd Session: 2:00 - 2:30 pm

- Weed Control In Plasti-culture Tomatoes
  - Equipment used
  - Chemicals Herbicides for Tomatoes

Root Fungus:

Southern Blight - White Mold

(*Sclerotia fungus*)

Symptoms:

- First symptoms often appear at the time fruit is beginning to develop.
- Dry woody area of stem just above ground level.
- Disease totally cuts off water/nutrient transport to the plant.
- Plant suddenly wilts and dies.
- Cool, wet spring weather is the deal soil conditions for Southern Blight.

My experience with Southern Blight

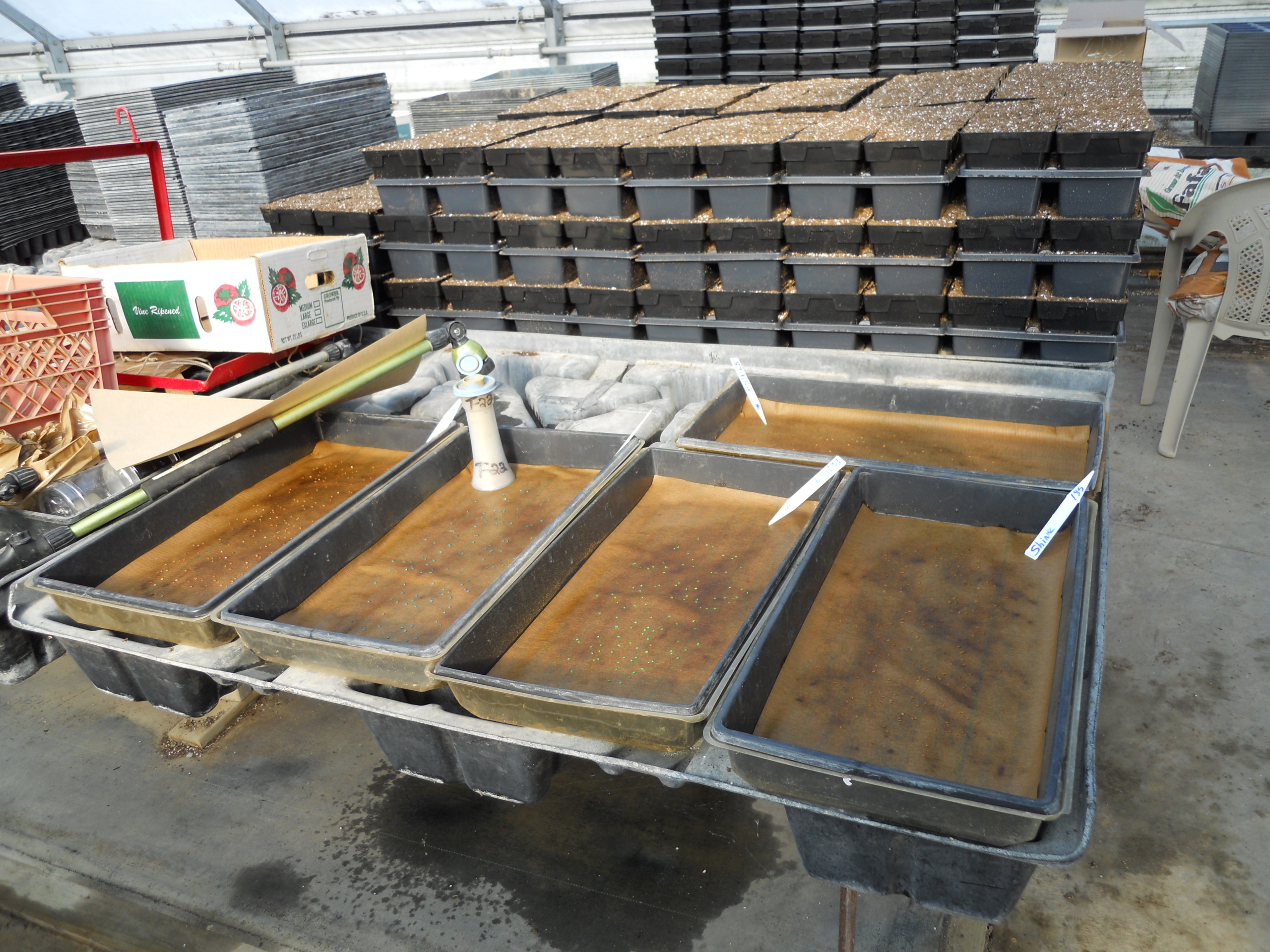
- In 2005, I lost about 500 plants - 25%, of early planted tomatoes.
- Vegetable experts told me there was "*no remedy or prevention available.*"
- Seed company catalog advertised Rootshield (T-22).
- Label said it prevented root diseases, such as phytophthora, rhizoctonia, but not sclerotinia.
- I decided to try this biological fungicide. After using last 10 years, plants lost to the disease has been reduced to almost zero.

T22 RootShield

- Developed by Cornell University & produced by BioWorks.
- Good soil bacteria strain, identified as the 22nd bacteria.
- It works by the good bacteria colonizing on the roots, which also fights pathogens.
- I get it from Johnny's Seed since they sell it in small 4 oz. size (about $20).
- Orders are shipped directly from BioWorks. Keep refrigerated.
- Dust the bacteria on seed before germination, using a salt shaker, as shown in next picture.
- A follow-up spray with RootShield is suggested for transplants on bench before field planting.

See Picture:

Dusting RootShield on tomato seed in germination trays.


Vine Ripened
MEDIUM
LARGE
EXLARGE
GROWER
Shine
135

Bacterial Canker

- A very damaging disease and difficult to eradicate.
- Can enter the greenhouse by contaminated seed. Either inside the seed coat on outside seed hull
- Thrives in greenhouse environments.
- You can search internet for symptoms and pictures.

My Experience With Bacterial Canker:

- I began loosing a lot of plants in my high tunnel and also in field tomatoes.
- Noticed disease symptoms on transplants in greenhouse.
- I always used clean plug trays & new germination mix, but had not sanitized rest of the greenhouse.
- Greenhouses provide a warm, humid climate, which is an ideal environment to host several pathogen diseases.

Greenhouse Sanitation Principles:

"An Ounce of Prevention is Worth a Pound of Cure"

- We need to take seriously experts advice to sanitize other areas of greenhouse, such as benches, under the benches, floors, walls, equipment, post, etc.
- Spray benches and floor as well as plug trays and carry trays with a sterilizing chemical before the growing season.
- Control weed populations…. both inside the greenhouse and outside the structure, which can harbor disease.

- Hot water seed treatment for bacterial canker inside the seed hull can be applied but must be done carefully.
- External seed hull treatment can be done using a Hydrogen Dioxide solution.

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Tomato Seed Treatment with

Oxidate or Zerotol

(27% Hydrogen Dioxide)

- **1:100 ratio (1% solution)**. =
  1/4 oz. in 24 oz. water or
  1/2 oz. in 48 oz water
- **Soak** tomato seed in small container for
  one (1) minute.
- **Drain** chemical solution….
- **Do not rinse seed**….
- Allow to **dry** in a kitchen wire **screen strainer**.

Tips:

- Use small medicine measuring cup for 1/4 oz. or 1/2 oz. measurement.
- Hydrogen dioxide water mixture can be stored long periods in a sealed container.

Leaf Fungus Diseases:

Early Blight (Alternaria)

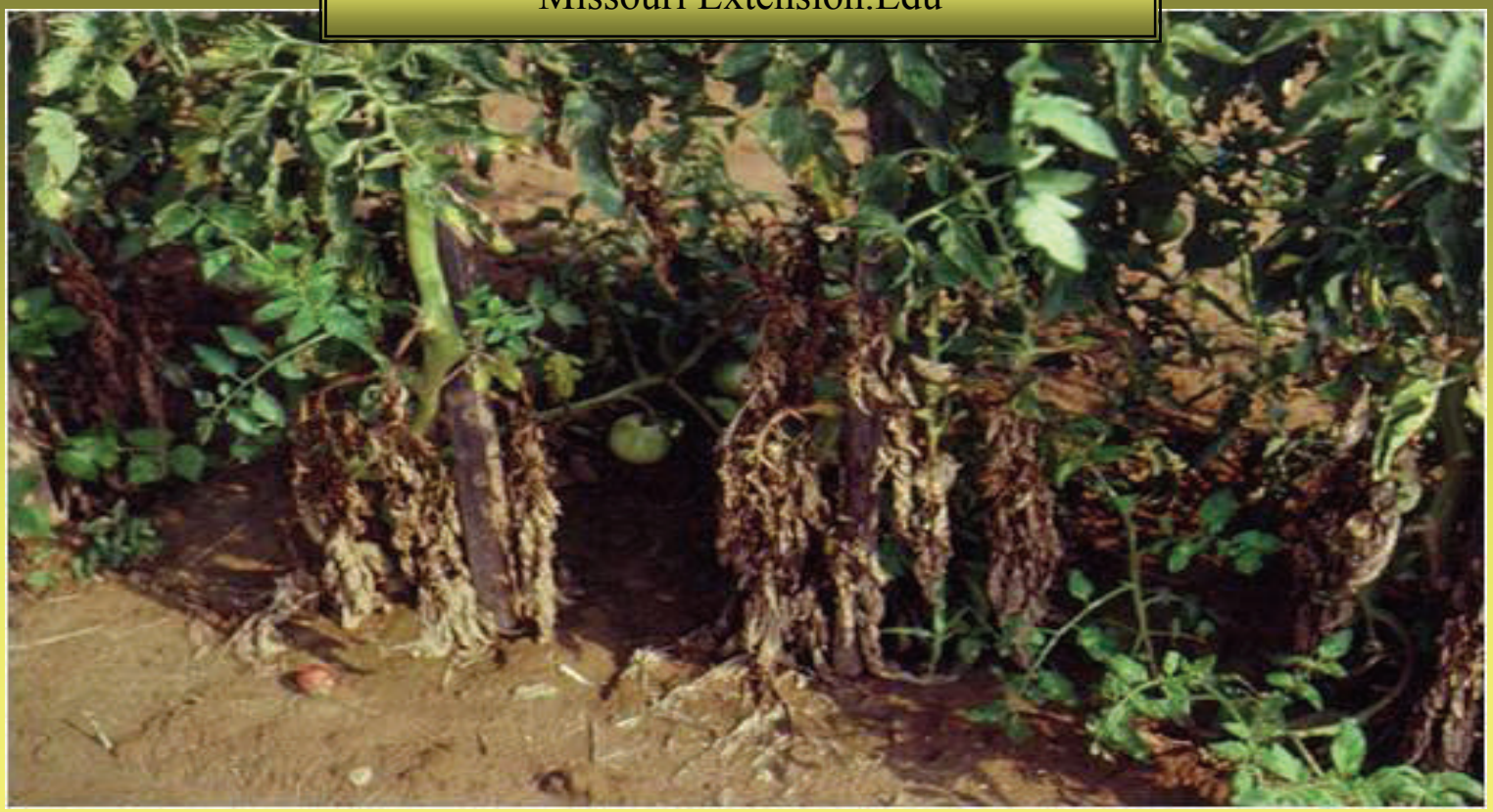
- Identified by black spots, with circle rings (like growth rings on tree stump).
- Warm, wet weather favors rapid spread of EB (Early Blight).
- Splashing rain, blowing dust settles on beds and lower leaves.
- Disease first starts on lower branches which touch beds.
- Disease spreads up the plant.
- EB can infect plants at any stage during the growing season, but usually progresses most rapidly after plants have set fruit.

Septoria Leaf Spot:

- Identified by random black spots on leaves.
- Dust collecting on leaves, followed by rain or dew ideal condition for disease development.
- Avoid mechanical practices when wind will carry dust to land on plants.
- Using equipment like finish mower or bush hog during dry, windy periods can spread septoria.

Early Blight

Missouri Extension.Edu



UnivFlorida.Edu

Leaf Diseases:

Preventative Measures:

- Lower leaves & branches are like magnets for the disease.
- Prune off the lower and older branches while still in greenhouse plug trays a few days before transplanting.
- Spray transplants in the greenhouse with cooper and/or mancozeb the day before field planting.
- Follow an early and consistent spray program though the growing season.
- Avoid all mechanical stirring up blowing dust on plant foliage, such as mowing machines or vehicles driving near the plants, especially on windy days.

Fungicide Control Plan:

- Most fungicides which are approved for tomatoes are "**Contact**", or surface action only.
- **"Contact"** fungicides work by **inhibiting the growth or reproduction of fungus or bacteria spores.**
- Fungicides are most effective when applied **BEFORE** the disease penetrates the plants and the disease can develop.
- Fungicides should be rotated to prevent fungicide resistance to the disease!

So what fungicides should I use for a good spray program?

- Good spray rotation program by North Carolina State University Extension (NCSU), as shown on next two slides.

Table 1. Suggested weekly spray schedule and products[Y] for foliar disease control in NC.

Before harvest (targets are early blight, bacterial spot, or both)	Week 1 -	mancozeb + copper + Actigard
	Week 2 -	mancozeb + copper
	Week 3 -	mancozeb + strobilurin + Actigard
	Week 4 -	mancozeb + copper
	Week 5 -	Endura LOW RATE[Z] + Actigard
	Week 6 -	mancozeb + copper
	Week 7 -	mancozeb + strobilurin + Actigard
	Week 8 -	mancozeb + copper
During harvest (targets are early blight, late blight, or both; or gray mold)	Week 9 -	Endura LOW OR HIGH rate[Z] + chlorothalonil
	Week 10 -	Revus Top OR Presidio OR Ranman
	Week 11 -	chlorothalonil + strobilurin
	Week 12 -	Revus Top OR Presidio OR Ranman
	Week 13 -	Endura LOW OR HIGH rate[Z] + chlorothalonil
	Week 14 -	Revus Top OR Presidio OR Ranman
	Week 15 -	chlorothalonil + strobilurin
	Finish season with chlorothalonil	

[Y] Mancozeb, copper, chlorothalonil, and strobilurin are common names for products sold under various trade names (see Table 2). Actigard, Endura, Ranman, Revus Top, and Presidio are trade names of products from Syngenta, BASF, FMC, Syngenta, and Valent respectively. Refer to labels, Table 2 and the text above for rates to use in volume-based spraying.

[Z] Low rate of Endura controls early blight; high rate controls early blight & Botrytis gray mold. High rate is only necessary if conditions are conducive for gray mold (cool / wet right before & during harvest).

Strobilurin products must be rotated as per label restrictions, and to limit development of fungicide resistance in the early blight pathogen. Actigard applications should be limited to reduce the risk of phytotoxicity and plant stunting.

Field trials have also found **Regalia** or **Serenade Max** to have some efficacy against bacterial spot.

Table 2. Amount of product / 100 gallons, assuming a max. of 100 gallons / acre at full plant growth.

Common name	FRAC	PHI (days)	Product name	Amount/100 gal	Max. amount per acre per season
chlorothalonil	M M M+33	0	Bravo Ultrex, Equus DF Bravo WeatherStik Catamaran	1.3 to 2.6 lb 1 3/8 to 2.0 pints 5.0 to 7.0 pints	18.3 lb 20 pints 50 pints
fixed copper	M	varies check label	Kocide 3000 Cuprofix Ultra 40 Disperss MasterCop	0.75 to 1.75 lb 1.25 to 3.0 lb 0.75 to 1.0 pints	varies; check label
mancozeb	M	5	Manzate Pro-stick, Penncozeb 75DF Dithane DF45	1.5 to 3.0 lb	22.4 lb
boscalid boscalid penthiopyrad	7 7 7	0 0 0	Endura Endura Fontelis	LOW rate 3.0 oz HIGH rate 9.0 oz 10.0 to 24.0 fl oz	25.0 oz 25.0 oz 72.0 fl oz
strobilurin	11 11 11+7	0 1 check	Cabrio EG Quadris 2.08F Priaxor	8.0 to 12.0 oz 5.0 to 6.2 fl oz 4.0 to 6.0 fl oz	96.0 oz 37.0 fl oz 24.0 fl oz
famoxadone + cymoxanil	11+27	3	Tanos	6.0 to 8.0 oz	72.0 oz
cyazofamid	21	0	Ranman	2.1 to 2.75 fl oz	16.5 fl oz
mandipropamid + difenoconazole	40+3	1	Revus Top	5.5 to 7.0 fl oz	28.0 fl oz
fluopicolide	43	2	Presidio	3.0 to 4.0 fl oz	12.0 fl oz
Bacillus subtilis	44	0	Serenade Max	1.0 to 3.0 lb	NA
acibenzolar S-methyl	P1	14	Actigard 50WG	0.33 to 0.5 oz	6.0 oz
Reynoutria sachalinensis	P5	0	Regalia	0.5 to 1.0 gallon	NA

Note: *Recommendations for the use of agricultural chemicals are included here as a convenience to the reader. The use of brand names and mention or listing of commercial products does not imply endorsement by North Carolina State University nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Examine a current product label before applying any chemical. For assistance, contact your county North Carolina Cooperative Extension Service agent.*

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	Week 6 -	mancozeb + copper
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	Finish season with chlorothalonil	

Oxidate or Zerotol

- *Exact same product— just labeled for different applications.*
  - *Produced by BioSafe*

27% Hydrogen Dioxide (HD)

- Powerful plant foliage sanitizer, which kills both bacteria and fungus spores that may be present on the plant.
- Reason for adding this product is it quickly sterilizes the plant so that follow-up fungicides can do better job of protecting the plant.
- It should be sprayed separately from other fungicides, since HD will react if tank mixed with other fungicides that contain minerals, such as **copper and mancozeb**.
- However, some fungicides are safe and compatible if tank mixed.
- Spray HD before other fungicides, since it kills spore population before rain can spread the disease.
- **Plan to always spray before a rain (if possible) …. Not after a rain.**
- Rainy periods often prevent the next spraying several days or longer periods.
- 27% hydrogen dioxide cannot be shipped UPS, only common truck carrier.
- BWI, Hummerts, and other chemical suppliers, stock these products, which can reduce freight cost.
- Labels for other applications can be downloaded from company website.

Spraying Recap:

How Fungicides work:

- Most fungicides work as a **contact** coverage protection. They will not stop the progression of diseases present.
- Fungicides are "***Preventative*", not "*Curative*".**
- Like getting a "*Flu Shot*"…. You can't wait until you get the flu to get a shot, and expect it to protect you.
- Disease spreads with moisture on leaves during rain and splash up.

When to Start Spraying & How Often:

- Prune all the lower branches in greenhouse. Spray on the bench with copper or mancozeb the day before field planting.
- Begin regular PREVENTATIVE spraying soon after transplanting
- Don't wait until you see disease symptoms visible on plants.
- Spray every 5-10 days after transplanting.
- Better to spray **before a rain** than **after a rain**, even if less than 7 days since last spraying.

What Fungicides to Use:

- Have a spray plan, such as the ***2013 NCSU Foliar Spray Plan.***
- Have all fungicides on hand before season starts.
- Spray with ***Oxidate/Zerotol*** first to kill spores present. Follow spray quickly with contact preventative fungicides.
- Rotating active fungicides to prevent disease resistance mutation.
- Use surfactant for better water coverage. If rain predicted…. Use a sticker-spreader, which is rain-fast in about an hour.
- Sprayer should be able to also spray bottom side of leaves.
- For better spray coverage & air movement, space plants 24-30".

Sprayer delivery systems:

- AirBlast sprayers are used by many growers.
- My sprayer is a single row, horseshoe shaped boom.
  - 10 spray tips provides good coverage of the foliage.
  - 10 nozzles output is about 3 gpm at 60-75# psi.
- Spray directed up under the leaves is especially important for spider mites and aphids.
- Spray directed at lower leaves & limbs for early blight control.

Spraying Record Worksheets

- Over the past 20 years I have designed five different *Spraying Reference & Worksheet Forms* for assisting the spraying operation.
- The following 5 forms are filled-in examples of these forms.

- For growers interested, blank forms in a PDF file can be received free of charge.
- Information will be provided at the end of this session.

Chemical Labels: Quick Reference Summary

Alternaria (Early Blight): **Quadris-V.Good**, **Cabrio-V.G.**, **Zerotol-V.G.**; Bravo-Fair; Copper-Fair, Tanos-Good; Mancozeb(s) formula: **Good**
Septoria Leaf Spot: **Quadris-V.G. CabrioV.G.**, **Zertol-V.G ; +Mancozebs-Good;** Copper-Fair;
Late Blight: **Bravo-V.G**; **Zertol-V.G.**, Quadris-Poor; Copper-Fair; Cabrio-Poor; Tanos-None;

Crop : Tomatoes
Chem Type: Fungicides

Chemical Name	Application Rate: Per Acre/ Per Gallon	Days (PHI) Post Harvest Interval	Additional Comments	Mode Of Action
Bravo - Grp M	2-3 Pts, ~~32-48 oz~~ Contact	0		M- multiple
Quadris Grp 11	5.0-6.2 oz Systemic	0		11
Tunnel - 1-2 oz / 15 gallon				
Cabrio Grp 11	8-12 oz/A 8-12 / 100 gal.	0		11
Late Blight - 16 oz				
Tanos Grp 27 & 11 onions	6-8 oz 8-10 oz	?3	Early Blight, late blight, Leaf Mold, Septoria / suppress Bact. Canker	27 11
Alternate with other than Grp 11 (Bacterial Canker suppress) Gray Mold (Good)				
Badger (copper)	2 8 oz Tunnel: 6 oz / 15 gal Contact	0		M
Zerotol (Hyd. Peroxide)	4 2 oz to 128 oz per 100 gallon Contact	0	Do Not Mix with Any Copper	M
Sterilizes; kills Bacteria & Fungus spores Gray Mold				
Mancozeb (s) "Manzate Pro-Stick" Penncozeb 75 DF	12-24 oz/A Contact Tunnel: 4 oz / 15 gal .75# - 2.0#	5		M
Plantshield (T-22)	Re-order small			

- Dust Tomato seed before covering w/ germ mix.
- Respray Tomato Transplants in greenhouse but before Planting

Spray Record Summary: Chemicals & Other Additives

Year: 2016 Crop: **Tomato** Location/Zone: Zone 9 - Florida 91

Chemicals & Additives

Spraying Dates	Days since last spraying	Manzate Pro-stick 12 to 24 oz (Gr p# M)	Badger (Cu) 28 oz (M)	Bravo/Echo 32 to 48 oz (M)	Quadris 5 to 6.2 oz (11)	Cabrio 8 to 12 oz (11)	Tanos 6 to 8 oz Grp 27 (11)	Endura Low = 3 oz/High = ~~9 oz~~ 7 oz (7)		Zerotol .0075 (.005-.01/oz water) (K)	Oxi-Phos .00333 + Zerotol .00333 (K)			Pounce 8-8 oz	Mustang 2.25-4 oz	FanFare (Bifenthrin) 5 to 13 oz	ABBA systemic 8 to 16 oz (7 day phi)	Acramite contact 12 to 16 oz	Sugar contact 10 % 4 #/40 gallon		Ascend (Growth Reg) 6 to 8 oz	Cal-Bor 16-128 oz/A.	Nu Film—17 6 to 8 oz/100 gal	Surfactant 6 to 8 oz/100 gal
PHI days		5					3								1	1	7	3						
6-29			X																				X	
7-23	24			X											X						X		X	
7-29	6						X									X			X					X
8-5	7	X														[redacted]	X				X			X
8-10	5				X					X						X			Rows 1-4		X		X	
8-11	X																		X					
8-16	5	Pick Fruit	X	X							separate spray					X					X			X
8-22	6							X		X				X							X		X	
8-31	9									X				X										X
9-2	2					X										X								X
9-7	5		Rain Forecast							X	Spider Mite Rows 1-4					X			X				X	
9-13	6			X	X										X									X
9-16		2"		Rain																				
9-21	8									X				X										X
9-22	–																		X				X	
9-23	2			X											X			X						X
10-29														X										

Tractor Speed Table

Seconds per 100 ft. *(time with a stop watch)*	*Feet of travel per Second*	***Feet of travel per Minute***	*Tractor Speed M.P.H.*
8 seconds	12.5 ft./sec.	**750 ft./min**	8.5 mph
9	11.11ft.	**667'**	7.6
10	10.0ft.	**600'**	6.8
11	9.1ft.	**545'**	6.2
12	8.33ft.	**500'**	5.7
13	7.69ft.	**462'**	5.2
14	7.14ft.	**429'**	4.9
15	6.67ft.	**400'**	4.5
16	6.25ft.	**375'**	4.3
17	5.88ft.	**353'**	4.0
18	5.56ft.	**333'**	3.8
19	5.26ft.	**315'**	3.6
20	5.00ft.	**300'**	3.4
21	4.76ft.	**286'**	3.2
22	4.55ft.	**273'**	3.1
23	4.35ft.	**260'**	3.0
24	4.17ft.	**250'**	2.8
25	4.0ft.	**240'**	2.7
26	3.85ft.	**230'**	2.6
27	3.7ft.	**222'**	2.5
28	3.57ft.	**214'**	2.4
29	3.45ft.	**207'**	2.4
30	3.33ft.	**200'**	2.3
31	3.23ft.	**194'**	2.2
32	3.13ft.	**188'**	2.1
33	3.03ft.	**182'**	2.1
34	2.94ft.	**176'**	2.0
35	2.86ft.	**171'**	1.9
36	2.78ft.	**167'**	1.9
37	2.7ft.	**162'**	1.8
38	2.63ft.	**158'**	1.8
39	2.56ft.	**154'**	1.7
40	2.5ft.	**150'**	1.7

Steps for Tractor Speed calculation:

1. Measure off a **100 ft test strip.**
2. Use a stop watch or second hand.
3. Have tractor moving at assigned **RPM speed** before passing starting point.
4. Convert **travel seconds** to the **travel feet per minute**. Record **feet/minute** on ***Tractor Travel Speed Record***
5. Record all the possible gears & RPM which might be used for spraying.

Formula for finding: Tractor travel feet per minute:

100 ft. ÷ ***seconds/100 ft.*** = ***feet/second*** × 60 seconds = ***travel feet/minute***

Divide 43,560 sq ft by spray width:

Spray width...		Row length/acre
4 ft	=	10,900 ft
5 ft	=	8,700 ft
6 ft	=	7,300 ft
8 ft	=	5,500 ft
10 ft	=	4,356 ft
12 ft	=	3,630 ft
14 ft	=	3,111 ft
16 ft	=	2,723 ft
18 ft	=	2,420 ft
20 ft	=	2,178 ft
22 ft	=	1,980 ft
24 ft	=	1,815 ft
26 ft	=	1,675 ft
28 ft	=	1,556 ft
30 ft	=	1.452 ft

Designed by: **Dennis Hatfield**
30226 Holly Rd (417) 476-5454
Pierce City, Mo. 65723

My Tractor Speed *Record*

Record Feet of Travel Per Minute

See Tractor Speed Table for instructions

Designed by: Dennis Hatfield
30226 Holly Rd (417) 476-5454
Pierce City, Mo. 65723

Tractor Name: Valtra-4X4 6500

Tractor Gear	RPM 1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200			
1 Med-1						106										
1 Med-2					139	1.5										
1 Med-3						170 = 1.9										
2 Med-1						154	1.7									
2 Med-2						185	2.1									
2 Med-3						235	2.7									

Tractor Name: Valtra-[redacted]

Tractor Gear	RPM 1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200			
3 Med-1				2.4 =	210	230	= 2.6									
3 Med-2						260	= 3.0	353 = 4.0								
3 Med-3						333	= 3.8									
4 Med-1						300	= 3.4									
4 Med-2				4.0 =	353	375	= 4.3	353	= 3.9							
4 Med-3																

Tractor Name: Valtra

Tractor Gear	RPM 1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200			
1 Hi-1							375 = 4.3	400 = 4.5	429	= 429						
1 Hi-2						439	= 4.9									
1 Hi-3				5.2 =	462	527	= 6.0									

Spraying Record Worksheet

Crop Sprayed: Tomatoes Date: 8-22 20 16

Field Locations: Zone 9 - Florida 91

Field		
1.	Each row length:	250 ft.
2.	× No. of rows:	20
3.	= **Total row length to spray:**	5,000 ft.
4.	× Spray width:	ft.
5.	= Total sq. feet:	sq ft
6.	**Total acres:** (sq ft ÷ by 43,560) =	1 acres

Post Spraying Comments:

Tractor		
7.	Tractor / model:	Iseki-4WD
8.	Gear #:	4 Medium
9.	Engine Rpm:	Maximum RPM
10.	PTO: gear#/rpm	#3
11.	**Travel feet/min:** (see Tractor Speed Record)	214 feet/min

Total Row length *(line 3)*: 5,000 feet ÷

Speed: Ft./Min. *(line 11)*: 214 feet =

Total spraying time: 23 **minutes**

Sprayer		
12.	Tank capacity:	gal.
13.	Spray tips (# or type):	10-80-2/80-3
14.	Lbs of pressure:	75 #.
15.	Boom coverage:	ft.
16.	* **Total nozzle output** *(all nozzles)*:	3.35 gals./min

** Find gals/min. nozzle output by test spraying 10 gallons water. Divide gallons by the total min. & sec. to deliver spray. Or measure output from one nozzle times the total number of nozzles.*

Total Spraying Time: 23 minutes x

Actual Nozzle Output *(line16)*: 3.35 gpm = 77 *Gallons*

Fill tank with: 80 **gallons of water**

Design by: Dennis Hatfield
30226 Holly Rd (417) 476-5454
Pierce City, Mo. 65723

Chemicals & Additives	Label Rate *Application Rate*	Chemicals Added to Tank: *(Total Lbs, Oz, or Gallons)*
Endura	3oz to 9oz.	Highrate = 9 oz
Pounce	2-8 oz/A	6 oz
Nu Film 17 (Rain Soon) (spreader-sticker)		8 oz

Spraying Worksheet Forms - PDF

To receive the blank **SPRAYING FORMS**:

Send E-mail to: **Dennis Hatfield**

dhatfield@mo-net.com

Subject line: (type) *"Spraying PDF"*

North Carolina State University
Tomato Spray Guide - pdf download

Google search: type this subject:

"NCSU Tomato Spray Guide 2013"

Session #2

Weed Control in Plasti-culture

Starts on next page

Great Plains
Vegetable Growers Conference

January 13, 2016

Weed Control in Plasti-Culture Tomatoes

Dennis Hatfield
Pierce City, Missouri

Weed Control In Plasti-Culture Field Tomatoes!

- With methyl-bromide being recently phased out for strawberries, growers were looking for weed control in plasti-culture strawberries.
- Allan Straw, Virginia Extension Specialist in 2013, did herbicide research for weed control in strawberries, spraying different approved herbicides.
- Allan experimented with spraying the herbicides on the soil, but under the plastic as the mulch was being laid.
- He found that best results for both weeds and grass control was:
  - **Prowl H_2O** and **Spartan 4F**,
  - Both of these products are approved for tomatoes.
- Spraying herbicides under the plastic is now widely used by many strawberry growers.
- This management technique is the method I now use with very good weed control in tomatoes and onions.

- **For tomatoes**: I had used **Dual** pre-emerge herbicide for many years.
  - Using a 4 seated RainFlo Water Wheel Transplanter, with one person riding back seat and a 12 volt spray nozzle.
  - An employee directed one quick squeeze of the spray wand into the 4" diameter hole in the plastic after tomato planted.

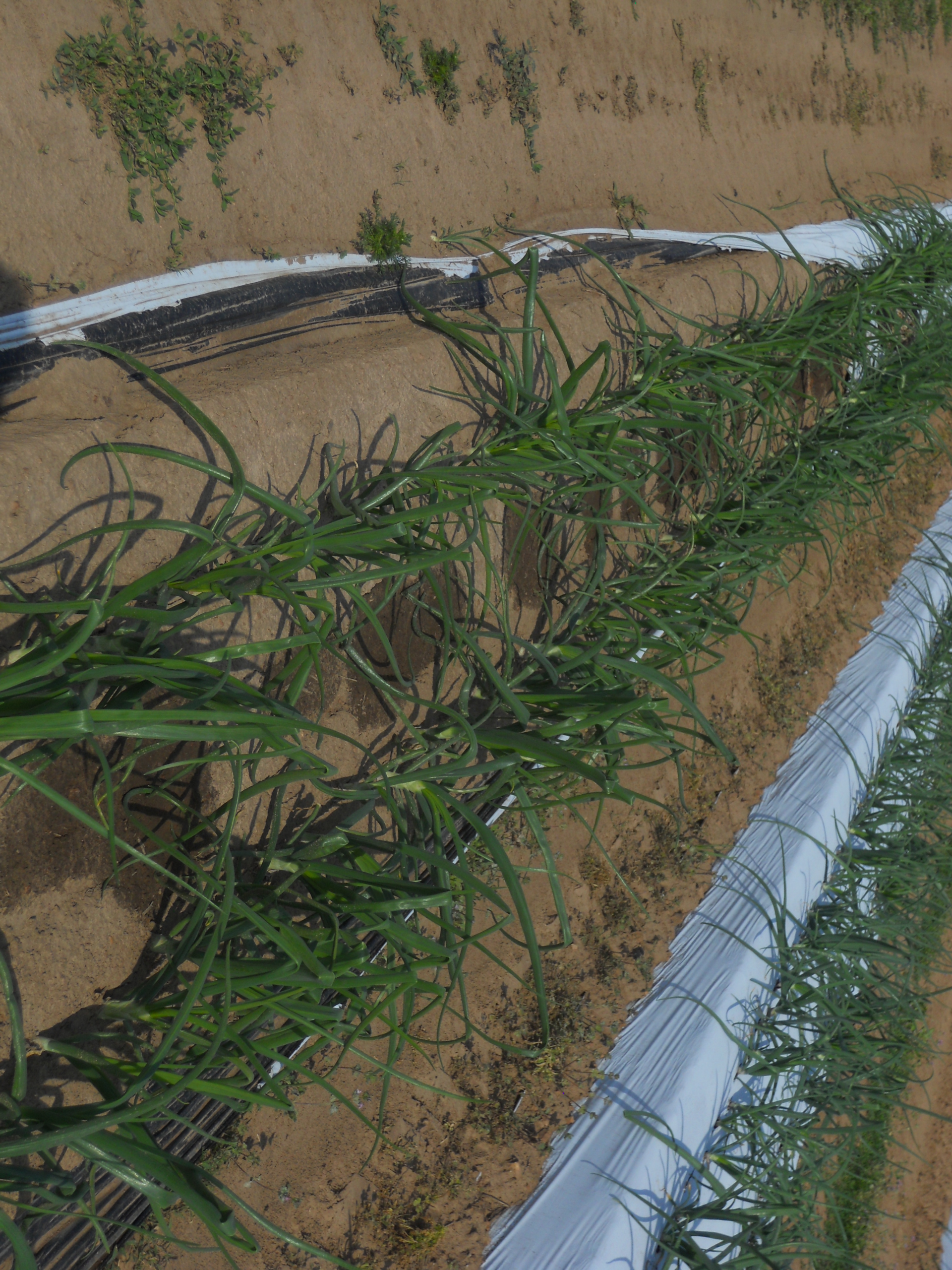
- **Next 5 pictures** show this weed control method:

Pictures #1 & 2: Show spray nozzles mounted on a RainFlo 2600 Mulch Layer to spray on the underside of the plastic.

***Picture #3 & 4*:** Bare onion bed laid open about 45 days. Picture taken May 13, 2016.

Picture #5: Spraying between tomato bed with 2 spray nozzles mounted on RainFlo Transplanter


MODEL 1300W
Bed Width




VEGETABLE TRANSPLANTER
MODEL 1400
Mfg. By NAN-FLO IRRIGATION
Serial #
2250

My Plan for Spraying
Pre-emerge Herbicides—Approved For Tomatoes:

- **Dual**: 16-21 oz/A. (apply 16 oz/A.)
- **Spartan 4F**: 4-8 oz/A. (apply low rate: 4-6 oz/A.)
- **Prowl**: 28-38 oz/A. (apply 32 oz/A.)

  - **Dual & Spartan 4F** (under plastic when laid)
  - **Prowl or Dual** (along raised bed edges and walkways after plastic laid).

- Calculate spray acres by multiplying bed width times the total bed row length.
- Add 1 to 2 gallons extra water to insure chemical mixture does not run out.
- Use 12 volt sprayer with electric **ON/OFF** control on tractor.

Post-Emerge—grass control only:

- **Poast or Select 2EC** will control grasses
- **Roundup** Band spraying no wind drifting, (20# pressure), can be sprayed along edges.
- Use string trimmer and/or lawn mower for manual control of grass & weeds in walkways.

Spraying Worksheet Forms - PDF

To receive the blank **SPRAYING FORMS**:

Send E-mail to: **Dennis Hatfield**

dhatfield@mo-net.com

Subject line: (type) *"Spraying PDF"*

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