



HAIRY NIGHTSHADE CONTROL IN DRY BEANS

Marty Fehringer



TOPIC OF DISCUSSION

- USE **PRE-PLANT APPLICATION** OF EPTAM FOLLOWED BY A **POST-EMERGE** APPLICATION OF EPTAM FOR EXTENDED NIGHTSHADE CONTROL
- SUSTAIN **SUFFICIENT LEVELS** OF EPTAM IN THE SOIL
- **PREVENT STAINING** OF BEANS CAUSED BY NIGHTSHADE BERRIES
- ELIMINATE EARLY SEASON **COMPETITION** FOR NUTRIENTS, WATER, AND LIGHT

NIGHTSHADE IN DRY BEAN

- NIGHTSHADE WEEDS ARE A VERY SERIOUS PROBLEM IN BEAN PRODUCTION.
- NIGHTSHADES CAUSE SIGNIFICANT YIELD LOSS AND THE PROBLEMS CREATED AT HARVEST CAN RENDER THE BEANS UNUSABLE AND LEAD TO DOCKAGE AND REJECTION.
- HAIRY NIGHTSHADE IS MEMBERS OF THE SOLANACEAE FAMILY, AND HAVE THE DISTINCTIVE FLOWER RESEMBLING THOSE OF THE POTATO AND TOMATO.
- NIGHTSHADE IS AN ANNUAL AND RELIES SOLELY ON SEED PRODUCTION FOR REPRODUCTION. IT IS NOT UNCOMMON FOR ONE PLANT TO PRODUCE **200,000 SEEDS**, AND REMAIN VIABLE IN THE SOIL FOR **TEN** YEARS.
- FOR LONG TERM CONTROL NIGHTSHADE, TOTAL LACK OF ANY SEED PRODUCTION IS NECESSARY.
- ONCE IN THE FIELD CONTROL OPTIONS ARE LIMITED, HAND REMOVAL BEING THE ONLY EFFECTIVE MEANS FOR LARGE PLANTS.

DRY BEAN QUALITY LOSS

- HAIRY NIGHTSHADE BERRIES SEVERELY REDUCE BEAN QUALITY DURING HARVESTING BECAUSE THEY **DO NOT DRY IN WINDROWS**.
- DURING THRESHING, **BERRY JUICES STAIN THE BEANS**; THE STICKY JUICES ON THE BEANS COLLECT DIRT AND DEBRIS DURING HARVEST AND WAREHOUSE HANDLING THAT CANNOT BE CLEANED OFF.
- THE STICKY SEEDS OF THESE WEEDS MAY ALSO SLOW OR CLOG THE THRESHER.
- IN STORAGE, MOISTURE FROM BERRIES CAN LOWER QUALITY.
- BERRIES LEFT IN THE FIELD WILL INFEST THE SOIL FOR THE FOLLOWING YEAR.
- IF PRESENT, PULL AND CARRY THESE WEEDS OUT OF THE FIELD BEFORE HARVESTING (NOBODY WANT TO DO THAT!!!).

WEED CONTROL IN DRY BEANS

- **DRY BEANS ARE VERY SENSITIVE TO WEED COMPETITION.**
- WEED GROWTH REDUCES BEAN YIELDS BY COMPETING FOR **LIGHT, WATER AND NUTRIENTS.**
- RESEARCH HAS SHOWN THAT WEEDS THAT EMERGE IN THE **FIRST 5 TO 7 WEEKS** AFTER PLANTING ARE MORE COMPETITIVE WITH DRY BEANS THAN WEEDS THAT EMERGE LATER. AFTER 7 WEEKS, DRY BEAN VINES ARE MORE COMPETITIVE AS THE **VINES SHADE THE ROW** AND SUPPRESS WEED GROWTH.
- HIGH WEED POPULATIONS CAN CAUSE A BUILDUP OF **DISEASE AND/OR INSECT PROBLEMS** THAT CAN AFFECT BEAN GROWTH, DEVELOPMENT, AND MARKETABILITY.
- WEEDS ALSO INCREASE HARVEST LOSSES, REDUCE BEAN QUALITY, AND MAKE SEED CLEANING MORE DIFFICULT AND EXPENSIVE.

WEED CONTROL IN DRY BEANS

- **GOOD SEEDBED PREPARATION** IS ESSENTIAL TO GIVE DRY BEANS A **HEAD START** ON WEEDS AT PLANTING TIME.
- **CULTIVATING** EMERGING WEED SEEDLINGS BETWEEN BEAN ROWS HELPS CONTROL WEEDS BETWEEN THE ROWS. HOWEVER, WEEDS USUALLY ARE NOT ADEQUATELY CONTROLLED IN THE BEAN ROW; HERBICIDES AND TILLAGE ARE NECESSARY.
- DRY EDIBLE BEANS MAY BE CULTIVATED SEVERAL TIMES DURING THE GROWING SEASON TO CONTROL WEEDS AND MAINTAIN IRRIGATION FURROWS.
- **CULTIVATION SHOULD BE SHALLOW** TO AVOID DAMAGING THE BEAN'S SHALLOW ROOT SYSTEM.
- DO NOT CULTIVATE OR HARROW WHEN BEAN FOLIAGE IS WET BECAUSE BACTERIAL LEAF DISEASES MAY BE SPREAD.

HAIRY NIGHTSHADE EFFECT ON CROPPING SYSTEMS



- Numerous disease, nematode, and insect pests of potato are worsened with the presence of hairy nightshade.
- Integrated management of these pests should always include hairy nightshade management.

INSECTS:

- COLORADO POTATO BEETLE
- GREEN PEACH APHID
- POTATO PSYLLID

NEMATODES:

- COLUMBIA ROOT KNOT
- STUBBY ROOT NEMATODE
- NORTHERN ROOT-LESION NEMATODE
- PCN

DISEASES:

- VIRAL DISEASES:
 - POTATO VIRUS Y (PVY)
 - POTATO VIRUS A (PVA)
 - POTATO LEAF ROLL VIRUS (PLRV)
 - TOBACCO RATTLE VIRUS (TRV)
- LATE BLIGHT
- POWDERY SCAB

NIGHTSHADE CONTROL OPTIONS

CULTURAL CONTROL

- DON'T RELY ON HERBICIDES ALONE, USED A MULTIFACETED ATTACK.
- GROW COMPETITIVE CROPS IN THE **ROTATION** (BREAK UP WEED BIOLOGY & **ROTATE HERBICIDES**).
- USE MECHANICAL CONTROL METHODS SUCH **AS TIMELY CULTIVATION**.
- USE **AGRONOMIC PRACTICES** THAT PROMOTE VIGOROUS CROP GROWTH (IRRIGATION AND FERTILIZER MANAGEMENT).

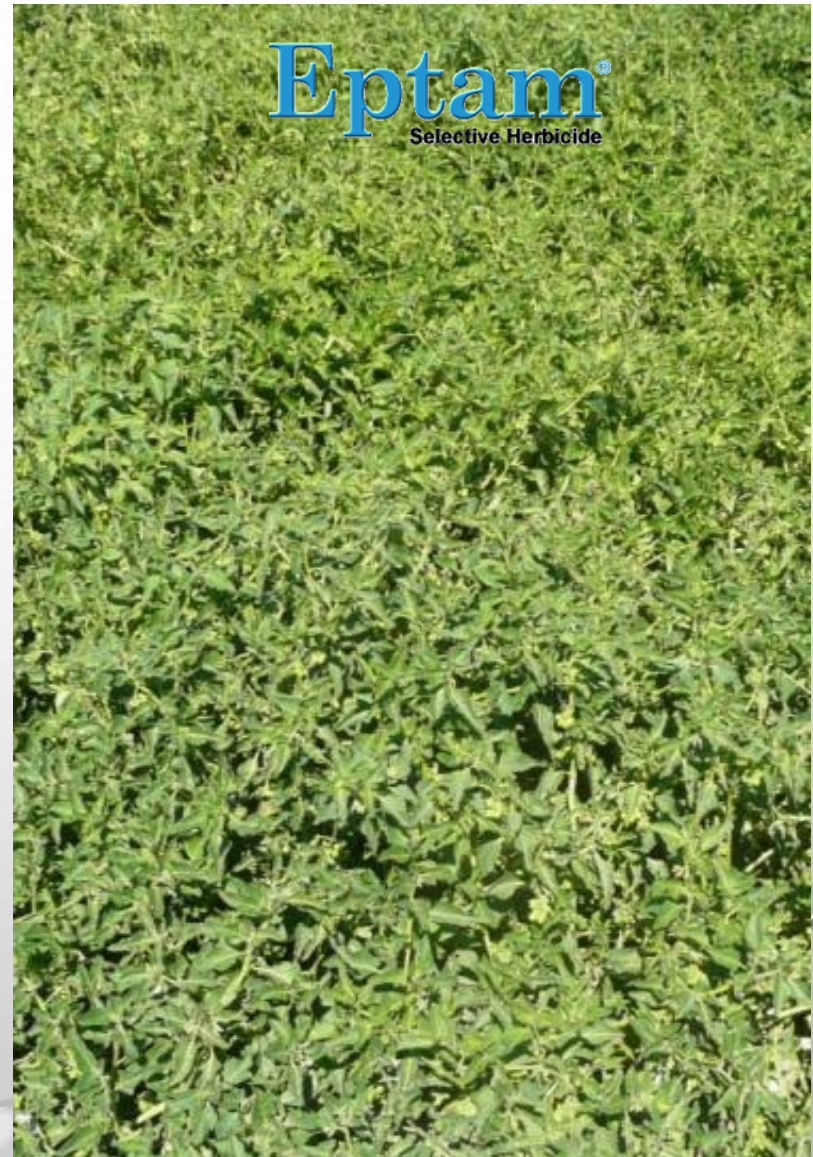
Eptam[®]
Selective Herbicide



NIGHTSHADE CONTROL OPTIONS:

Herbicide Control

- MANY HERBICIDES ARE REGISTERED FOR USE IN DRY BEAN.
- **EARLY SEASON** NIGHTSHADE CONTROL CAN BE ACCEPTABLE; HOWEVER, **FOR FULL SEASON CONTROL AN EFFECTIVE POST PRODUCT NEEDS TO BE APPLIED.**
- OTHER PRODUCTS HAVE LIMITED APPLICATION FLEXIBILITY DUE TO POTENTIAL **CROP INJURY.**
- WHEN NIGHTSHADE POPULATIONS ARE HIGH AND APPLICATION FLEXIBILITY IS NEEDED, USE **EPTAM!**



Eptam[®] KEY BENEFITS ...

Selective Herbicide

- **EPTAM-SONALAN** CONTROLS A BROAD SPECTRUM OF TOUGH GRASSES AND BROADLEAF WEEDS
- **TWO MODES OF ACTION** TO PREVENT WEED EMERGENCE AND EARLY COMPETITION WITH CROP
- EFFECTIVE ON WEEDS RESISTANT TO GLYPHOSATE AND OTHER CHEMISTRIES
- HIGH DEGREE OF **CROP SAFETY**
- FLEXIBLE **PLANT-BACK** OPTIONS

KEY BROADLEAF AND GRASS WEEDS CONTROLLED BY EPTAM - SONALAN

- BARNYARDGRASS
- COMMON
LAMBSQUARTERS
- CRABGRASS
- CUTLEAF
NIGHTSHADE
- FOXTAILS
- **HAIRY NIGHTSHADE**
- QUACKGRASS
- PIGWEEDS
- VOLUNTEER GRAINS
- KOCHIA
- WILD OAT
- RUSSIAN THISTLE
- BLACK NIGHSHADE
- WILD BUCKWHEAT

PPI, PRE AND POST APPLICATION FLEXIBILITY

- APPLY EPTAM (**4 ½ PINTS**) - SONALAN PRE-PLANT WITH GROUND EQUIPMENT OR EARLY PRE-EMERGENCE BY CHEMIGATION
- USE HIGHER RATES OF BOTH PRODUCTS TO CONTROL DIFFICULT WEEDS LIKE **NIGHTSHADE**, CRABGRASS, GROUND CHERRY, ETC.
- MAXIMIZE NIGHTSHADE CONTROL BY FOLLOWING THE PPI APPLICATION WITH A **POST-EMERGENCE** CHEMIGATION OF EPTAM (IN 0.5" WATER) AT 3 1/2 - **4 1/2 PINTS PER ACRE**
- DIRECTED SPRAY TO THE **SOIL AT THE BASE** OF THE PLANTS BEFORE BEAN PODS START TO FORM.

CROP ROTATION OPTIONS



- PLANT-BACK TO ALL CROPS IS PERMITTED
AFTER 45 DAYS



- REFER TO THE SONALAN HFP LABEL FOR
INFORMATION REGARDING PLANT-BACK
OPTIONS

RESTRICTIONS

- DO NOT EXCEED **9 PINTS** EPTAM 7E PER ACRE PER CROP.
- BEFORE APPLYING EPTAM 7E TO **UNTESTED** VARIETIES, **VERIFY WITH YOUR LOCAL SEED COMPANY (SUPPLIER)** THE SELECTIVITY OF EPTAM 7E ON YOUR SPECIFIC DRY BEAN CLASS AND VARIETY TO HELP AVOID POTENTIAL INJURY TO SENSITIVE CLASSES OR VARIETIES.
- **DO NOT USE** EPTAM 7E ON ADZUKI BEANS, COWPEAS (BLACK-EYED PEAS, BLACK-EYED BEANS), SOYBEANS, LIMA BEANS, MUNG BEANS, GARBANZO BEANS OR OTHER FLAT-PODDER BEANS EXCEPT ROMANO.
- **READ BOTH EPTAM AND SONOLAN LABELS FOR SPECIFIC PPE REQUIREMENTS AND OTHER LABEL RESTRICTIONS.**

Application Rates

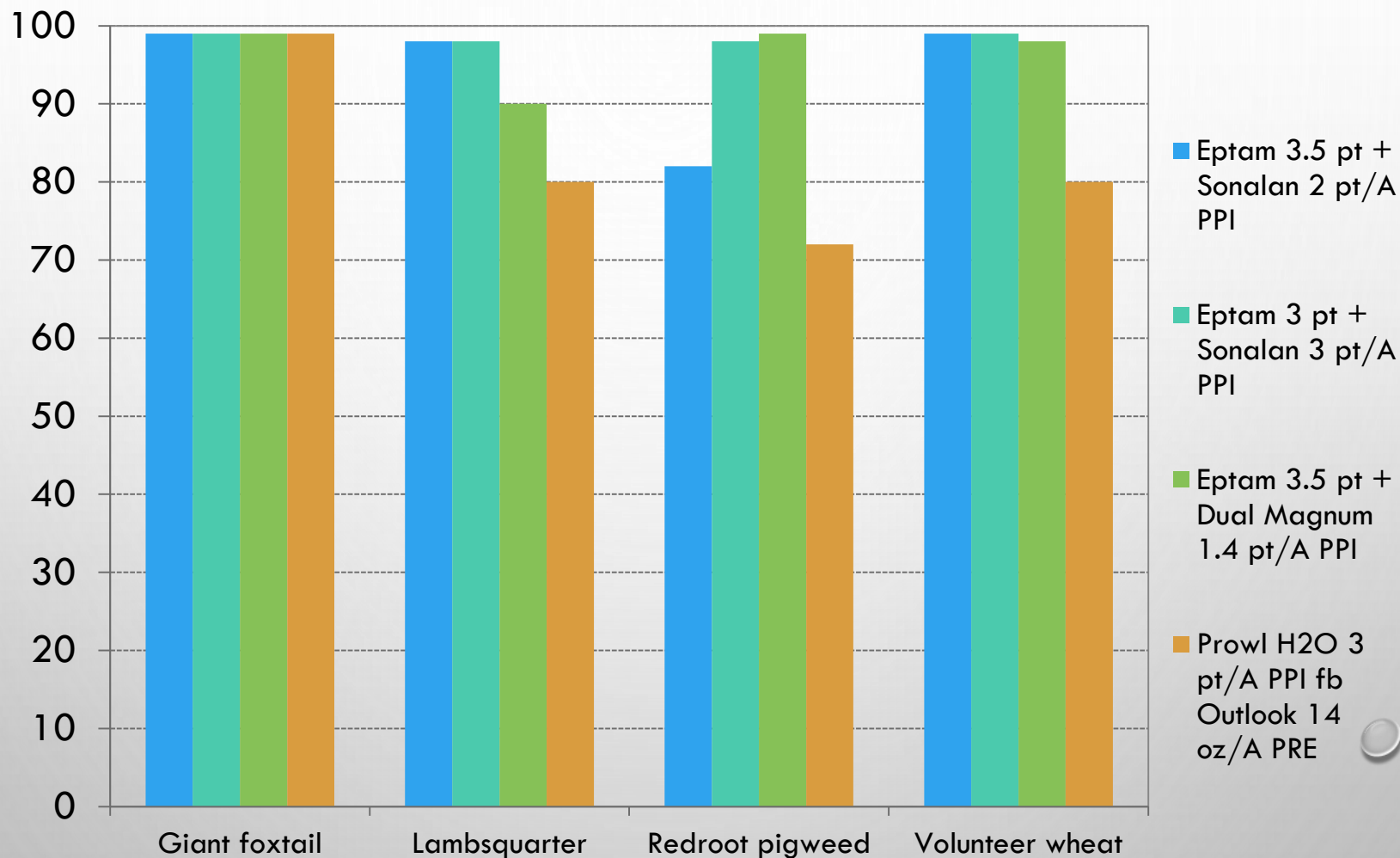
Eptam[®]
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| Soil Type | General Weed Control (pts) | General Weed Control | Nightshade and Groundcherry |
|-----------|----------------------------|----------------------|-----------------------------|
| Course | 2 ½ to 4 ½ | 1 ½ to 2 | 3 to 3 ½ |
| Medium | 2 ½ to 4 ½ | 2 to 2 ½ | 3 ½ to 4 |
| Fine | 2 ½ to 4 ½ | 2 ½ to 3 | 4 to 4 ¼ |

2011 EPTAM 7E TRIALS – DRY BEANS

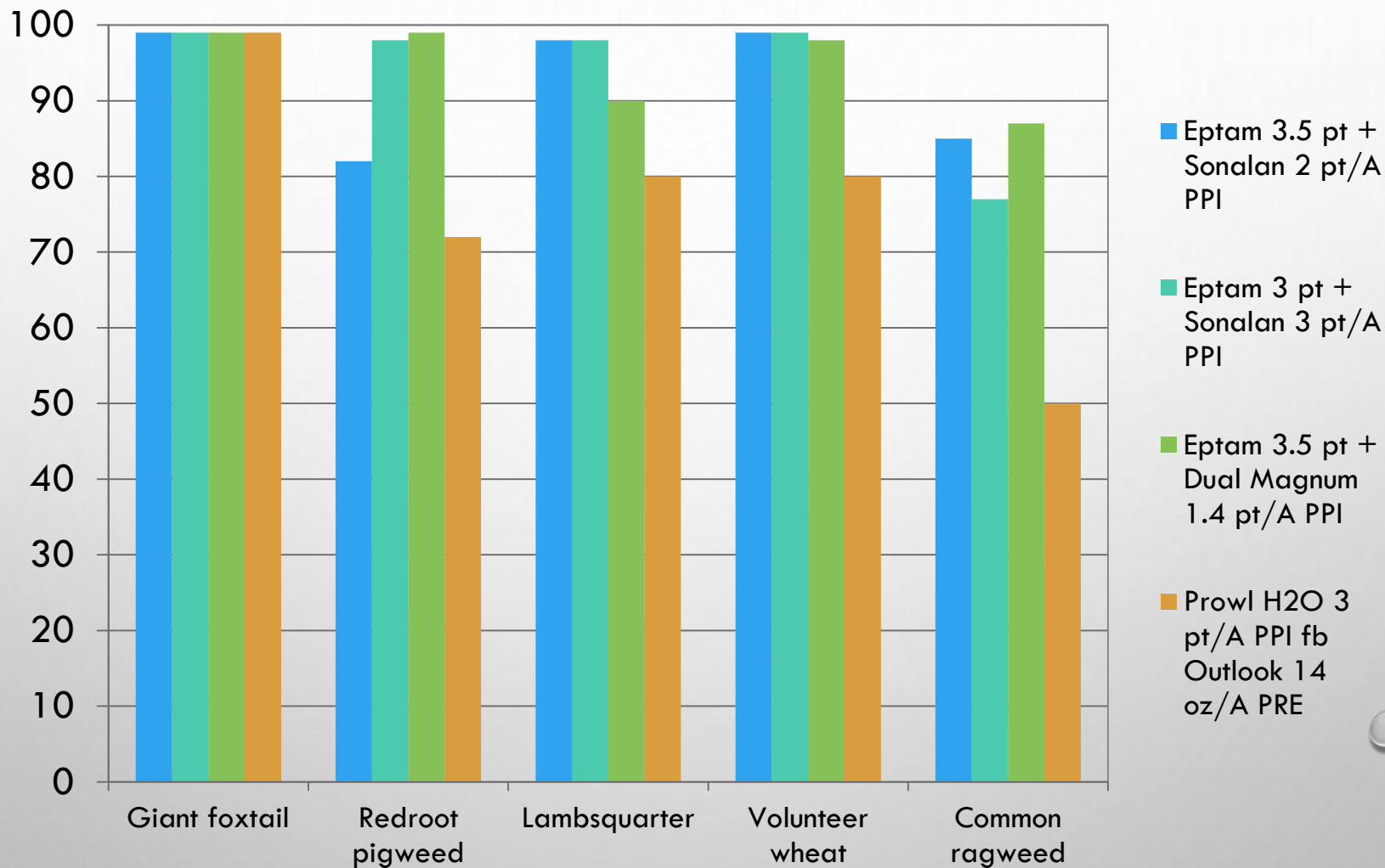
DR. RICH ZOLLINGER – NORTH DAKOTA STATE UNIVERSITY



% Control – 28 DAE

2011 EPTAM 7E TRIALS – DRY BEANS

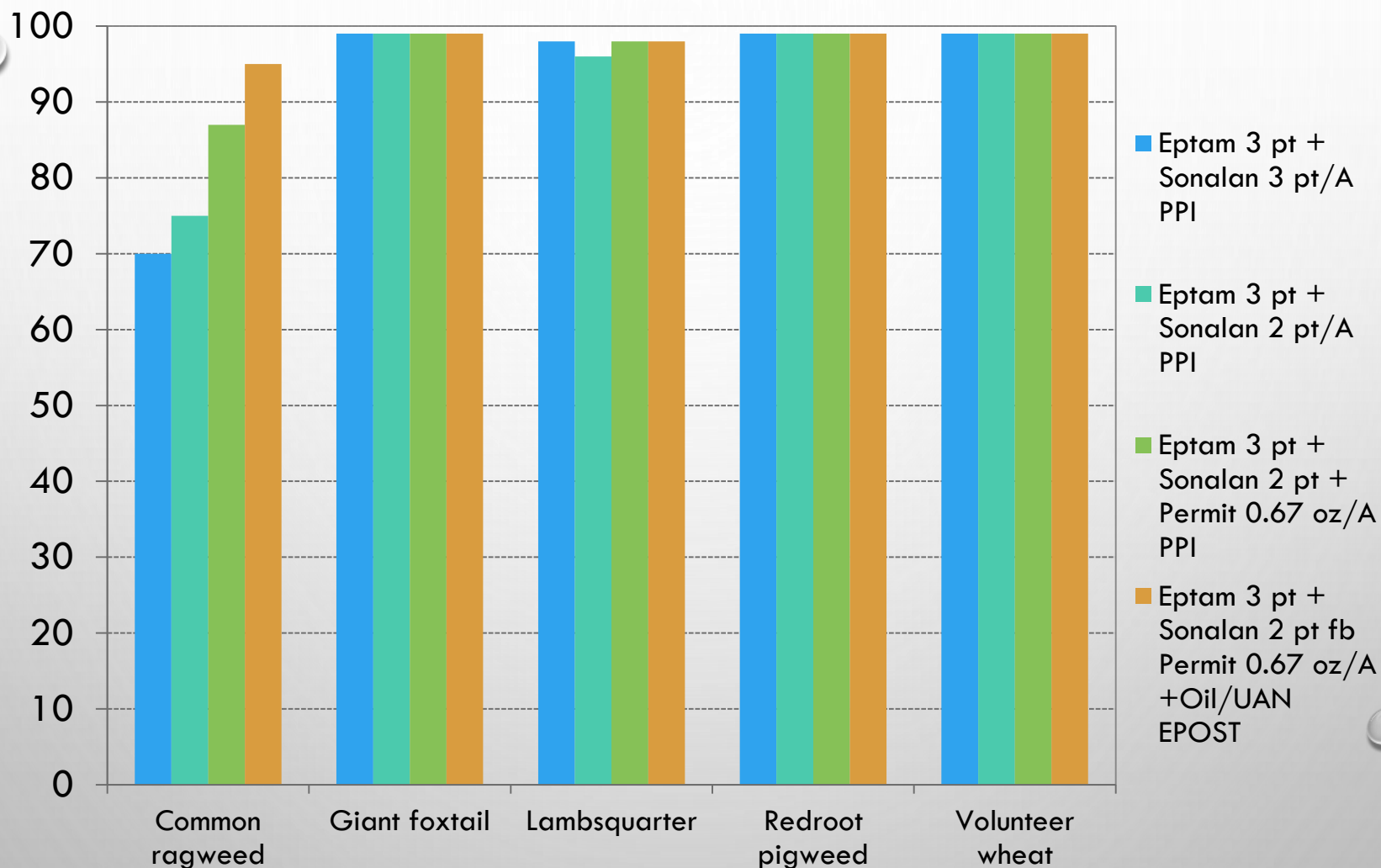
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% Control – 28 DAE

2011 EPTAM 7E TRIALS – DRY BEANS

DR. RICH ZOLLINGER – NORTH DAKOTA STATE UNIVERSITY



% Control – 28 DAP

DRY BEAN WEED AND CROP RESPONSE TO SELECTED HERBICIDES

| Response Ratings: Ratings are for light to moderate weed densities, favorable conditions and weed growth stage as specified on product label. High weed densities, adverse conditions, or large weeds will reduce control. 10= 96-100% 9= 90-95% 8= 85-90% 7= 80-84% 6= 70-79% 5= 60-69% 4-2= less than 60% 1= 0 | Broadleaves | | | | | | | | | Grasses | | | | Crop Safety* |
|---|-------------|--------|--------------|--------------------|---------|---------|-----------------|-----------|------------|----------------|---------------|-----------|---------|--------------|
| | Cocklebur | Kochia | Lambsquarter | Nightshade (Hairy) | Pigweed | Ragweed | Russian Thistle | Sunflower | Velvetleaf | Wild Buckwheat | Barnyardgrass | Crabgrass | Foxtail | |
| Herbicide | | | | | | | | | | | | | | |
| Eptam – PPI | 4 | 7 | 7 | 7 | 7 | 6 | 4 | 3 | 5 | 6 | 6 | 9 | 9 | 1 |
| Dual II Magnum - PPI/PRE | 4 | 4 | 7 | 7 | 8 | 5 | 4 | 1 | 5 | 2 | 8 | 9 | 9 | 1 |
| Outlook - PRE | 2 | 2 | 7 | 6 | 8 | 5 | 3 | 1 | 2 | 1 | 8 | 8 | 9 | 1 |
| Eptam + Sonalan - PPI | 5 | 9 | 9 | 9 | 9 | 5 | 5 | 1 | 5 | 6 | 9 | 9 | 9 | 1 |
| Eptam + Treflan or Prowl H ₂ O - PPI | 6 | 9 | 9 | 7 | 9 | 5 | 5 | 1 | 5 | 6 | 9 | 9 | 9 | 1 |
| Eptam + Dual II Magnum - PPI | 5 | 6 | 8 | 8 | 9 | 5 | 5 | 3 | 5 | 6 | 9 | 9 | 9 | 2 |
| Eptam + Outlook - PPI | 4 | 7 | 9 | 8 | 9 | 5 | 5 | 1 | 5 | 5 | 9 | 9 | 9 | 2 |



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Selective Herbicide

Dry Bean Rate Study 2010

EPT-10-06-T01

Cooperator: Don Morishita UI Kimberly, ID;

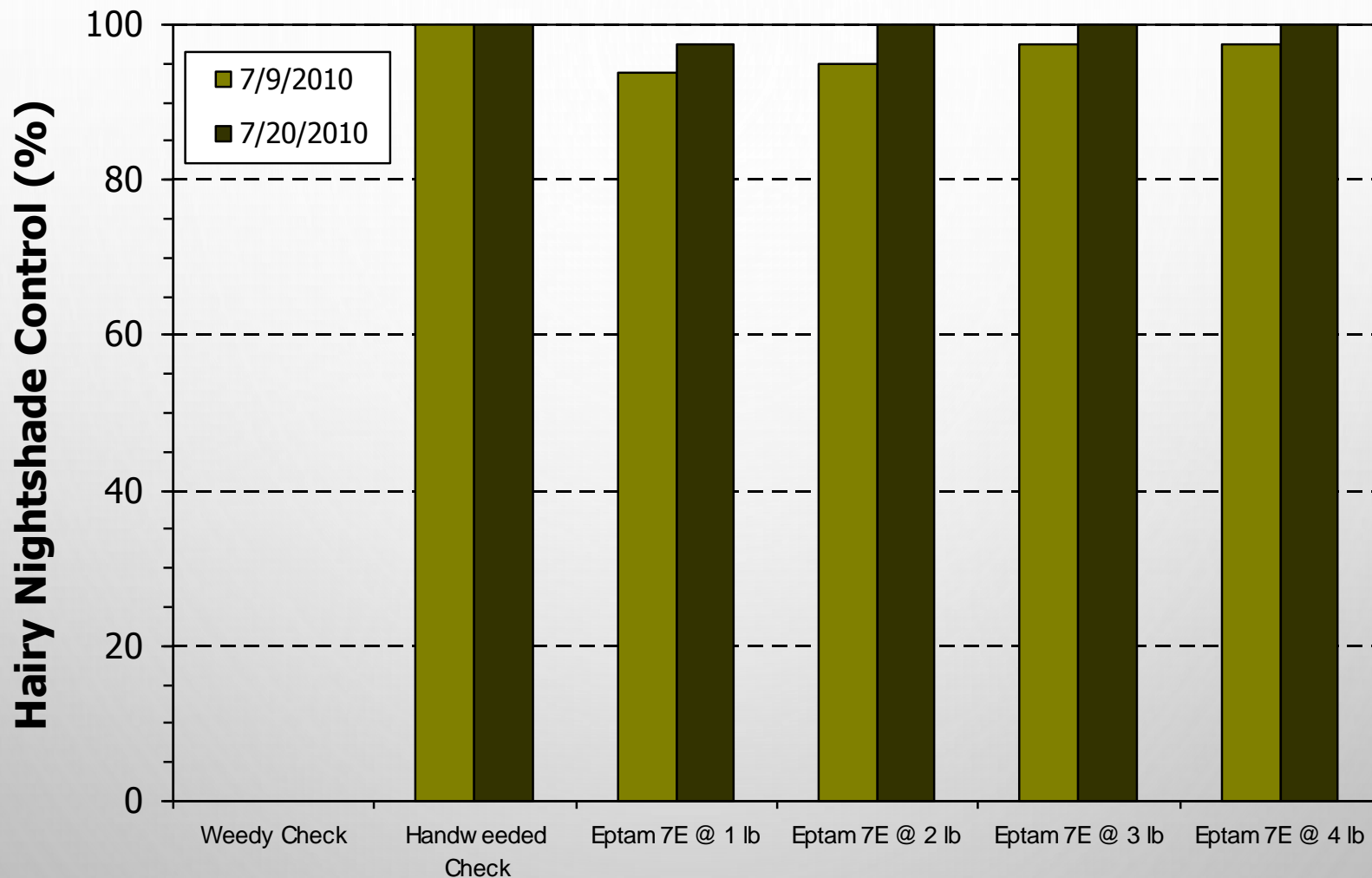
Cultivar: Othello Pinto;

Treated: PPI 6/08/10;

Planted: 06-08-10;

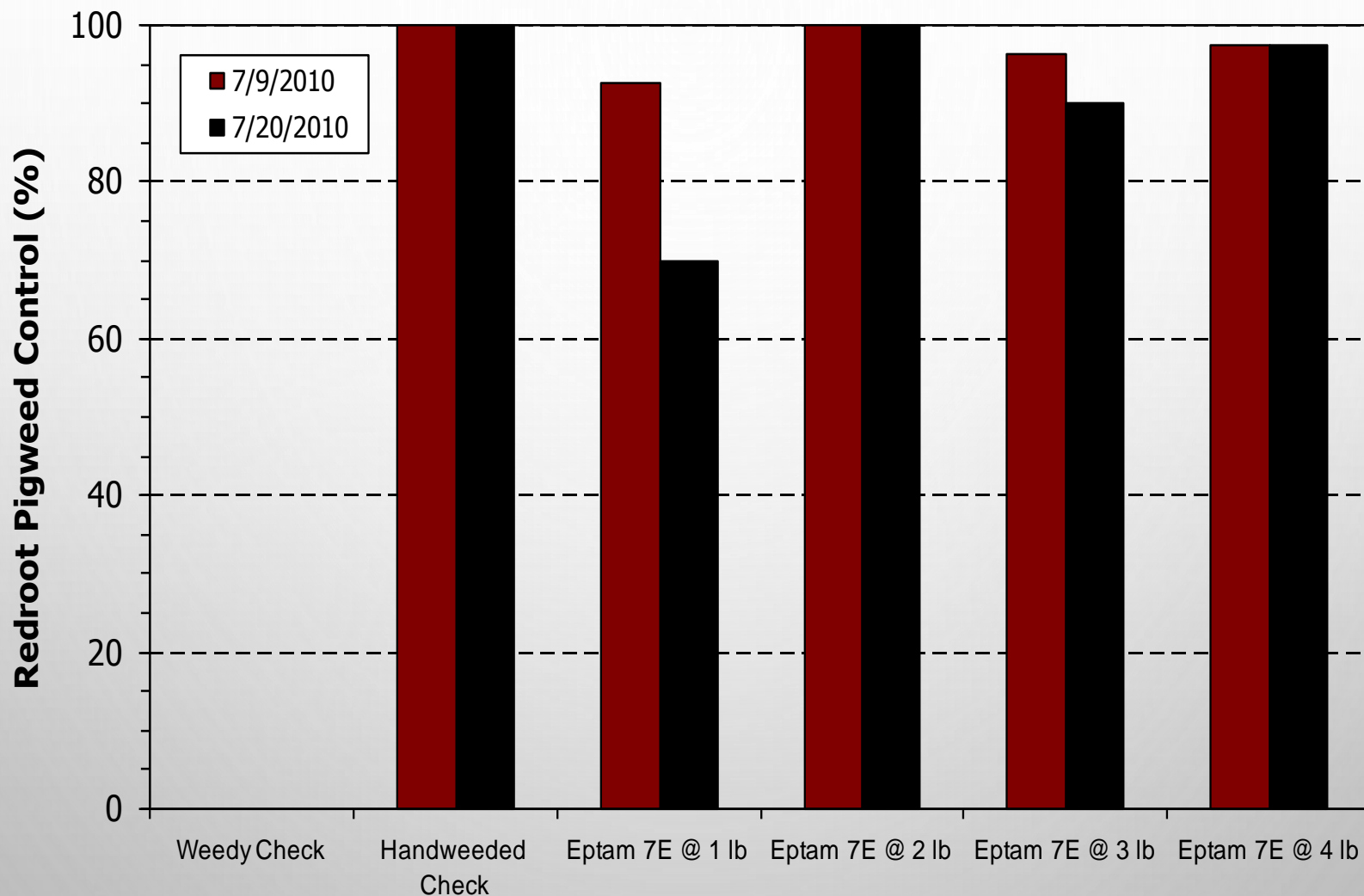
Harvested: 09/08/10.

Dry Bean Rate Study 2010



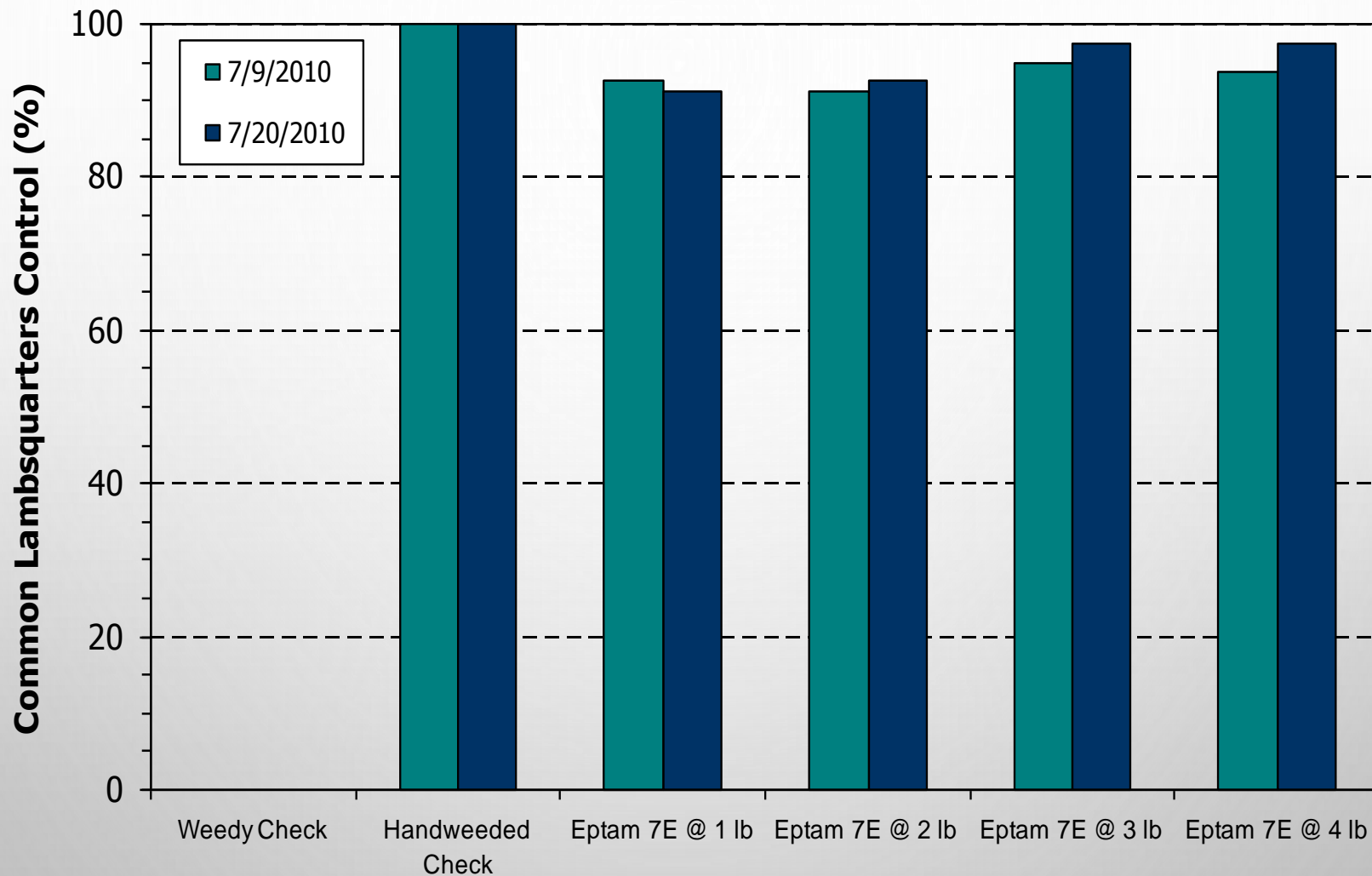
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Dry Bean Rate Study 2010



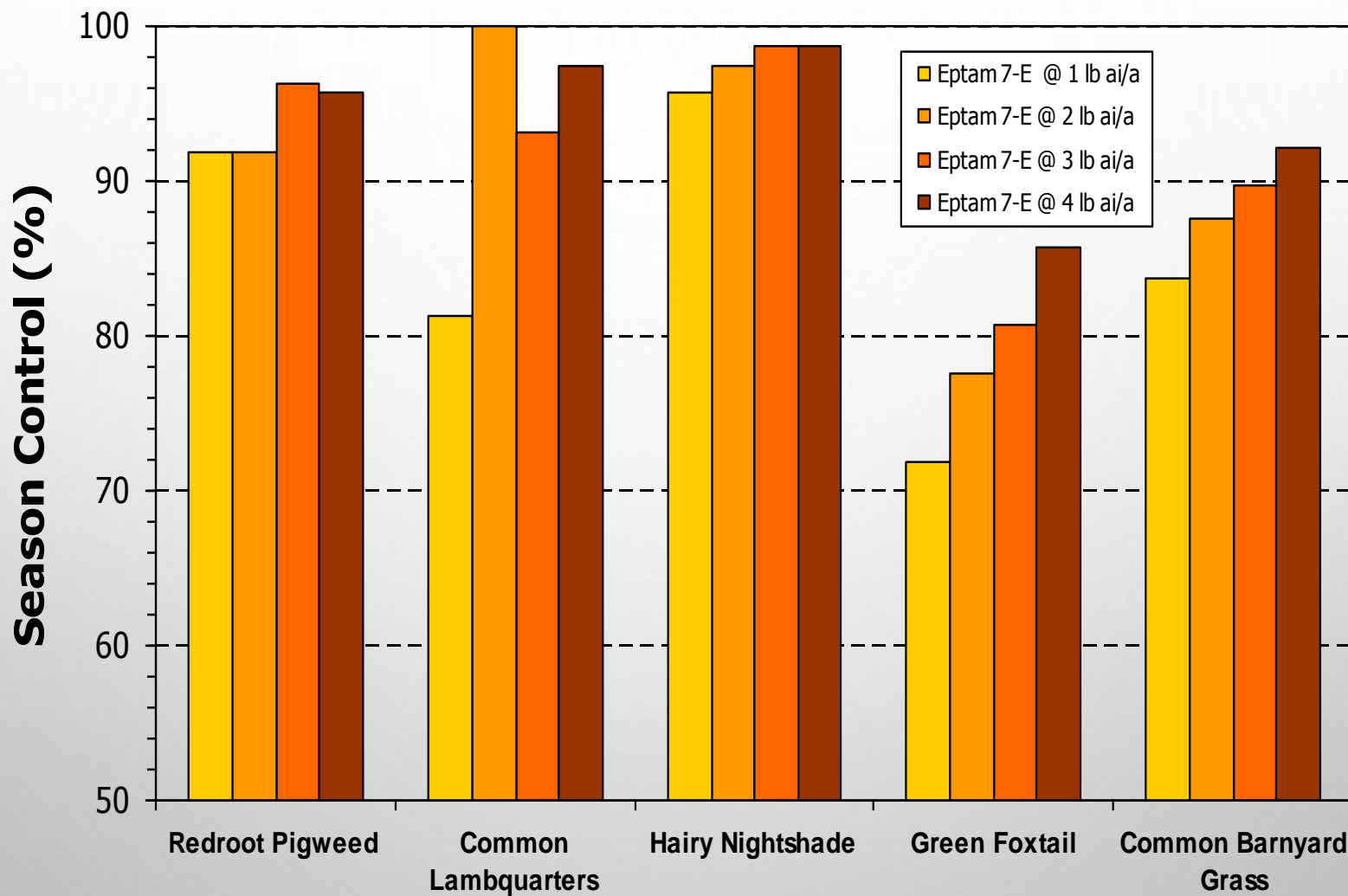
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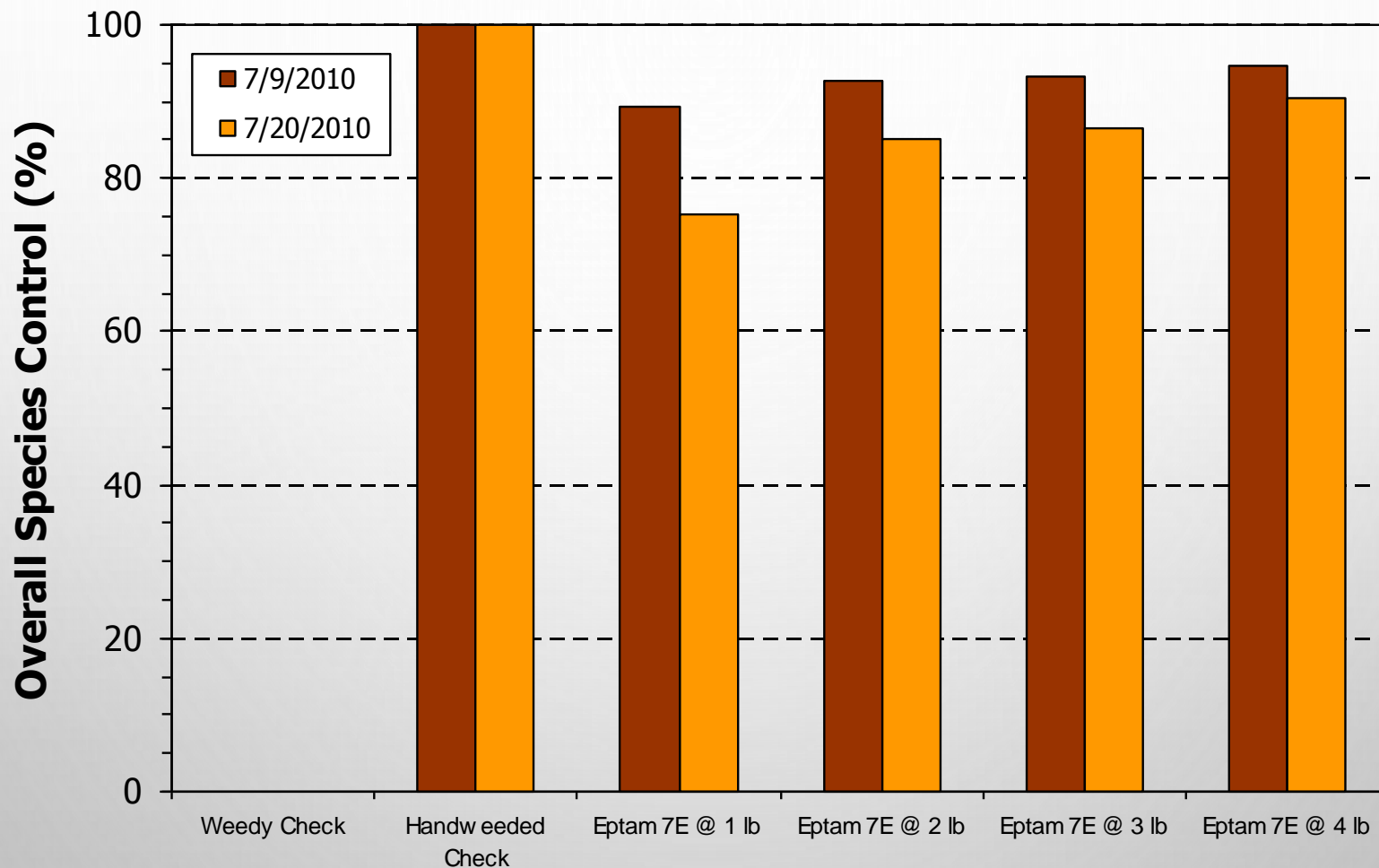
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Dry Bean Rate Study 2010



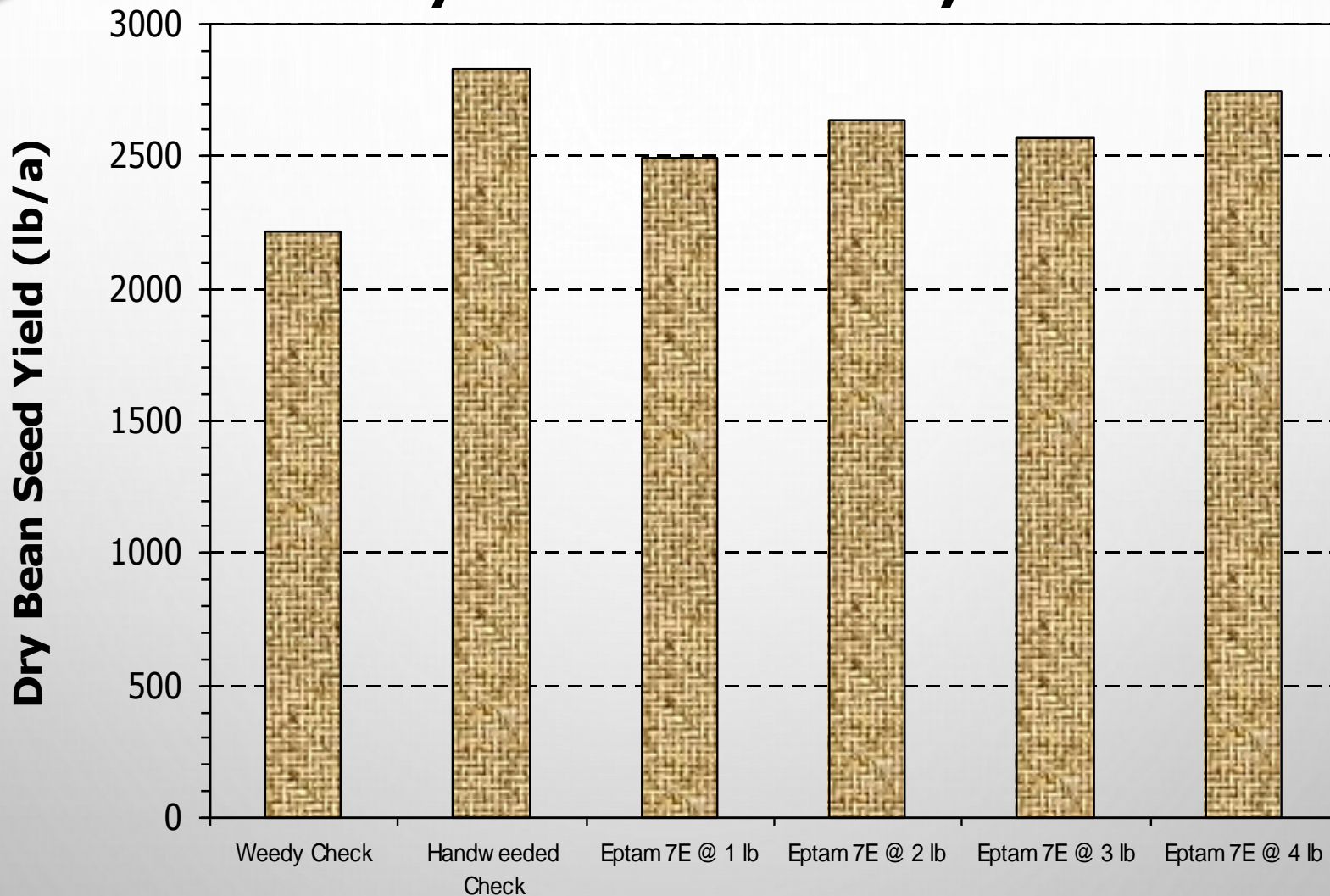
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Eptam[®]
Selective Herbicide

+



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For Two Spotted Spider Mite Control in Dry Beans

Gowan[®]
USA
The Go To Company



SPIDER MITES



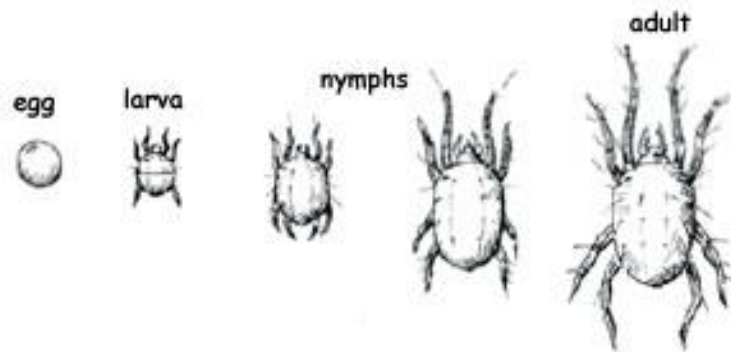
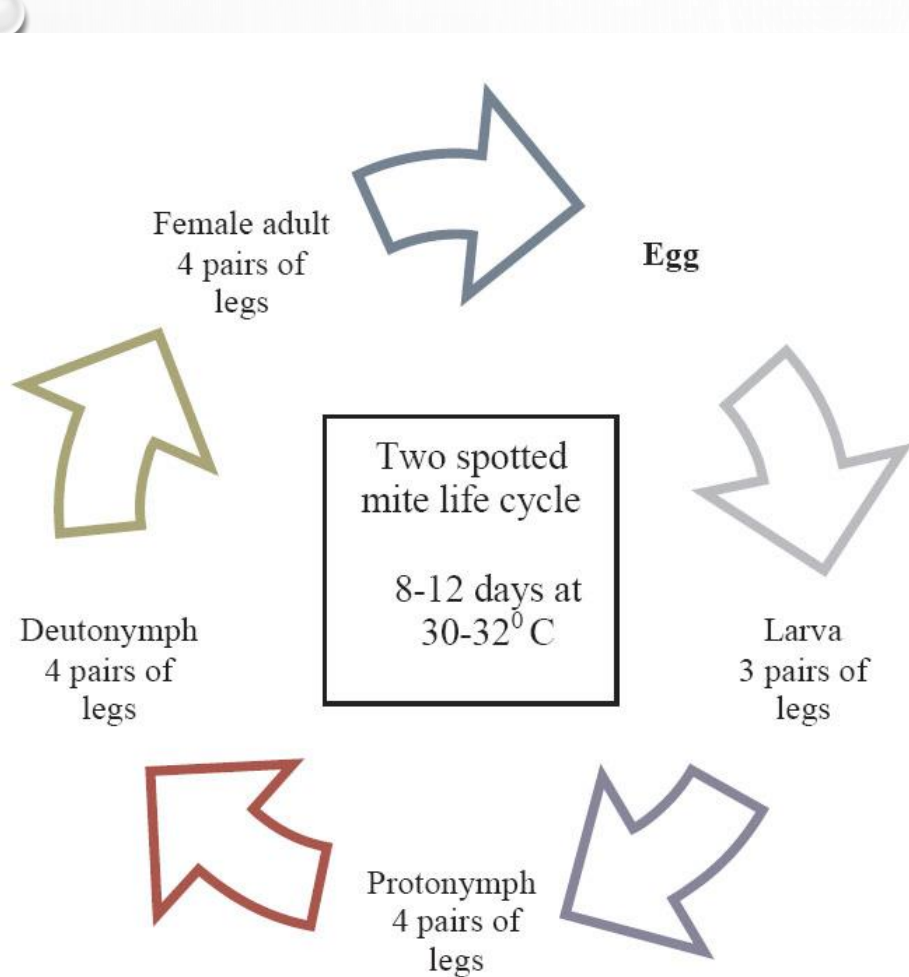
- SPIDER MITES CAN BE SERIOUS PESTS IN DRY BEANS IN MANY AREAS, ESPECIALLY DURING PERIODS OF **HOT DRY WEATHER**.
- DAMAGED LEAVES BECOME SOMEWHAT STIPPLED ON THE UPPER SURFACE AND GRAYISH BECAUSE OF WEBBING AND FEEDING ON THE UNDERSURFACE.
- SPIDER MITES POPULATIONS CAN EXPLODE AFTER TREATMENTS FOR OTHER INSECT PESTS.
- THE LOSS OF TEMIK HAS THE POTENTIAL TO MAKE MITES A PRIMARY PEST PROBLEM IN OUR REGION RESULTING IN EARLIER INFESTATIONS AND INCREASED YIELD LOSSES.

PEST IDENTIFICATION

- TWO SPOTTED SPIDER MITES HAVE TWO BODY SEGMENTS AND FOUR PAIRS OF LEGS
- ADULT FEMALE IS APPROXIMATELY 1/60 INCH LONG, ADULT IS 1/80 INCH LONG; APPEARANCE IS PALE YELLOWISH/GREENISH OR BROWNISH WITH TWO DARK SPOTS ON THE BACK
- FEMALES LAY UP TO 2-3 EGGS PER DAY, UP TO 50-100 EGGS DURING HER LIFETIME, EGGS HATCH 2-6 DAYS AND BECOME MATURE ENOUGH TO REPRODUCE IN AS LITTLE AS 5 DAYS
- SPIDER MITES LIVE IN COLONIES ON THE UNDERSURFACE OF LEAVES
- MITES FEED BY PIERCING AND SUCKING CELL CONTENTS FROM LEAVES
- PREFER HOT AND DRY CONDITIONS



SPIDER MITE LIFE CYCLE





SCOUTING TIPS

- SCOUT EARLY AND OFTEN WITH MAGNIFYING HAND LENS (10X)
- CHECK UNDERSIDE OF LEAVES FOR MITES, EGGS, AND WEBBING
- SCOUT THE EDGE OF FIELDS NEAR DIRT ROADS AND AREAS THAT ARE DRY. ALSO STRESSED AREAS OF FIELD FROM POORLY PRODUCTIVE SOILS AND/OR SOIL COMPACTION
- STIPPLED OR YELLOW LEAVES INDICATES MITE DAMAGE NOT TO BE CONFUSED WITH DISEASES, HERBICIDES, NUTRIENT DEFICIENCIES, EXCESSIVE MOISTURE, OR POOR GROWING CONDITIONS

Onager
Miticide

IDENTIFYING TWO SPOTTED SPIDER MITE





INTEGRATED PEST MANAGEMENT

- BIOLOGICAL CONTROL
 - PREDATORY MITES
- CULTURAL CONTROL
 - PROVIDE ADEQUATE IRRIGATION
 - KEEP GRASS AND WEEDS CLEAR FROM THE BORDERS OF FIELD
- MECHANICAL AND PHYSICAL CONTROL
- CHEMICAL CONTROL
 - USE SOFT CHEMISTRIES TO PREVENT MITE FLARE BACK
 - SELECT MITICIDES THAT PROVIDE LONG RESIDUAL PROTECTION
 - DO NOT CUT RATES AS TO CAUSE RESISTANCE



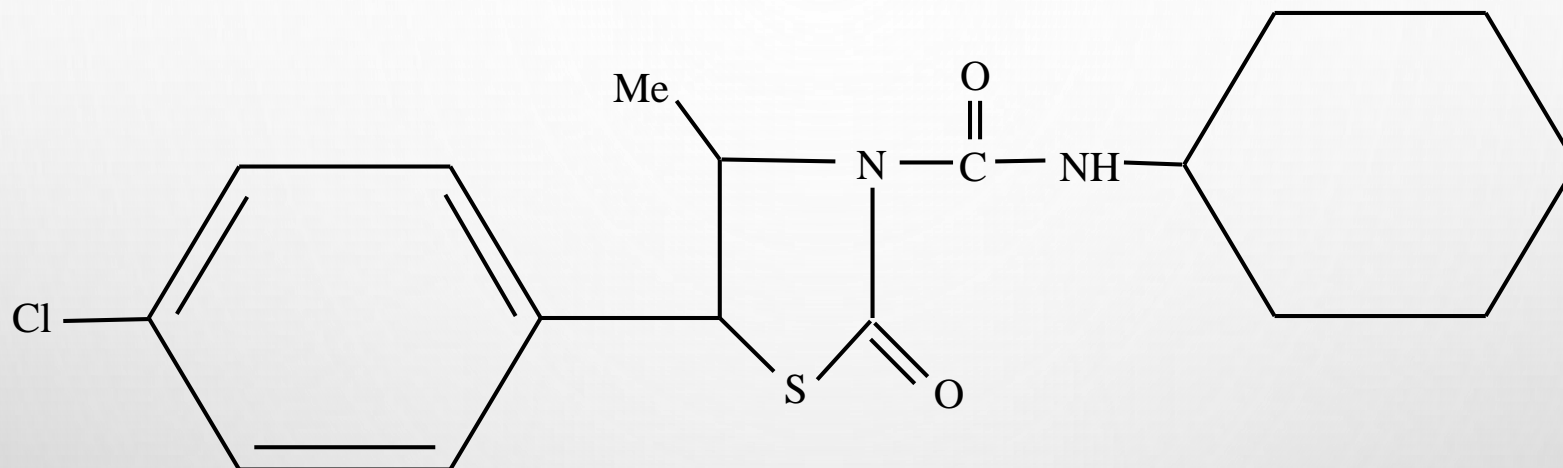
Onager[®]

Miticide



Onager[®]
Miticide

HEXYTHIAZOX

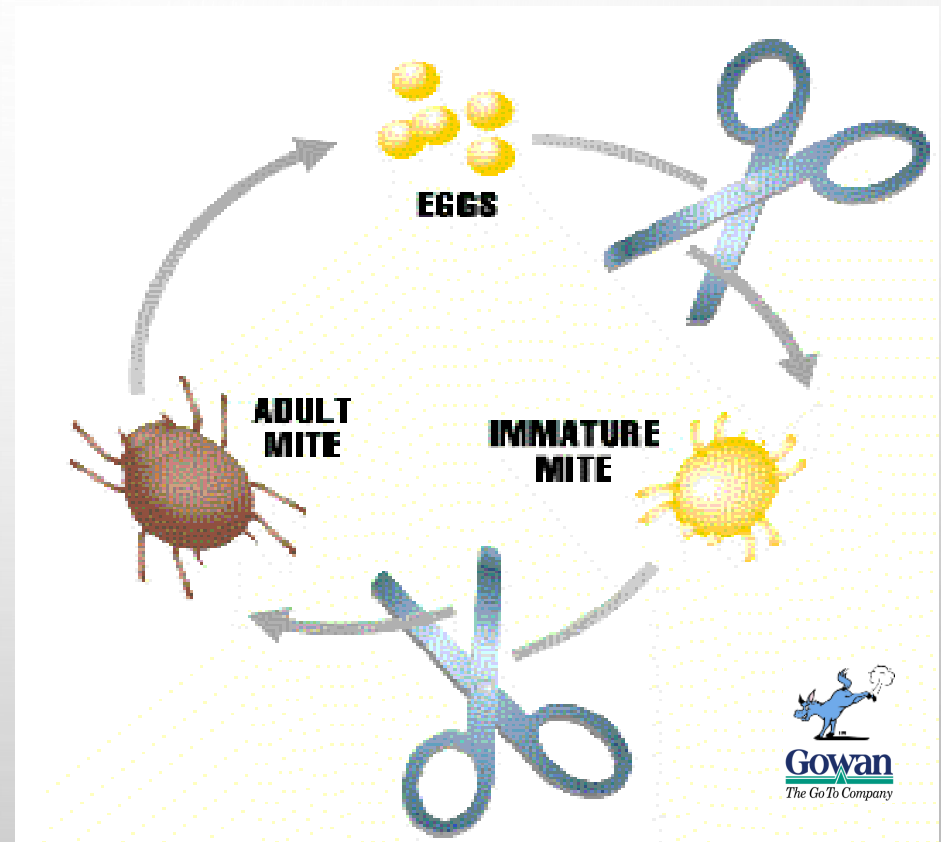


- Class thiazolidinone
- Miticide: ovicide/larvicide
- IRAC Group 10A



PERFORMANCE CHARACTERISTICS

- CONTROLS EGGS AND ALL NYMPH STAGES.
- DOES NOT CONTROL ADULTS.
- ADULT FEMALES CONTACTED WILL LAY INVIABLE EGGS.
- EXCELLENT RESIDUAL CONTROL – UP TO 9 WEEKS DEPENDING UPON CONDITIONS.



- NO DELAYED EGG HATCH
- NO EFFECT ON REPRODUCTIVE RATES
- NO EFFECT FROM EATING TREATED PREY
- NO IRRITATION OR REPELLENCY FROM EATING TREATED PREY



Western Predatory Mite

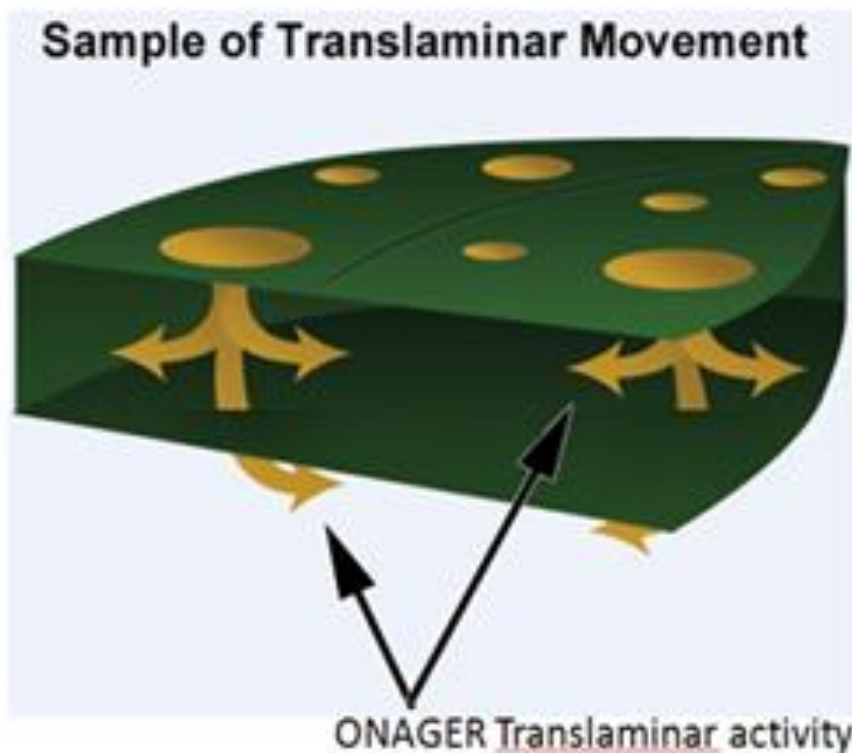


Phytoseiulus persimilis

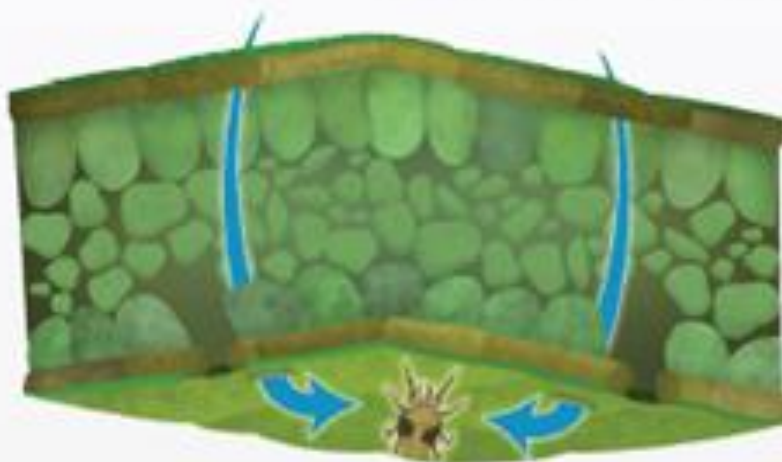


TRANSLAMINAR ACTIVITY OF ONAGER IN CORN LEAVES

- STUDIES HAVE SHOWN EXCELLENT TRANSLAMINAR ACTIVITY OF ONAGER IN CORN.



Onager[®] Miticide



Onager provides superior mite control in field corn with excellent translaminar activity

- The translaminar activity of Onager results in better control of key mite species attacking field corn due to the ability to reach mites that feed on the underside of the field corn leaf.
- The product inside the leaf is also protected from wash off and UV degradation.






LABEL REVIEW

- **SIGNAL WORD: "CAUTION"**
- **LOW TOXICITY TO MAN, FISH, AND WILDLIFE**
- **NON TOXIC TO BEES**
- **PPE: LONG SLEEVED SHIRT AND LONG PANTS, GLOVES, SHOES AND SOCKS**
- **REI = 12 HOURS**
- **PHI = 14 DAYS**



DRY AND SUCCULENT BEANS

| | | | |
|--|---|---------------------------------------|---|
| <p>BEANS, DRY AND SUCCULENT (14) (Western US <u>Only</u>*)</p>  | <p>PESTS: Two-spotted spider mite, Pacific spider mite, Strawberry spider mite</p> | <p>RATE (oz/a) 10 – 24</p> | <p>Apply Onager at the first sign of mites before populations begin to build.</p> |
| | <ol style="list-style-type: none"> 1. Do not apply more than a total of 24 oz. of formulated product per acre per year. 2. Do not make more than one application per year. 3. Do not harvest or graze bean vine forage or hay. 4. 14 day PHI <p>*May only be applied in the Western US - west of the line defined as follows:</p> <p>TX: W of Rt. 283 and NW of Rt. 377</p> <p>OK: W of Rt. 281/183</p> <p>KS, NE, SD, ND: W of Rt. 281</p> | | |

TIMING AND PLACEMENT KEY TO SUCCESS...

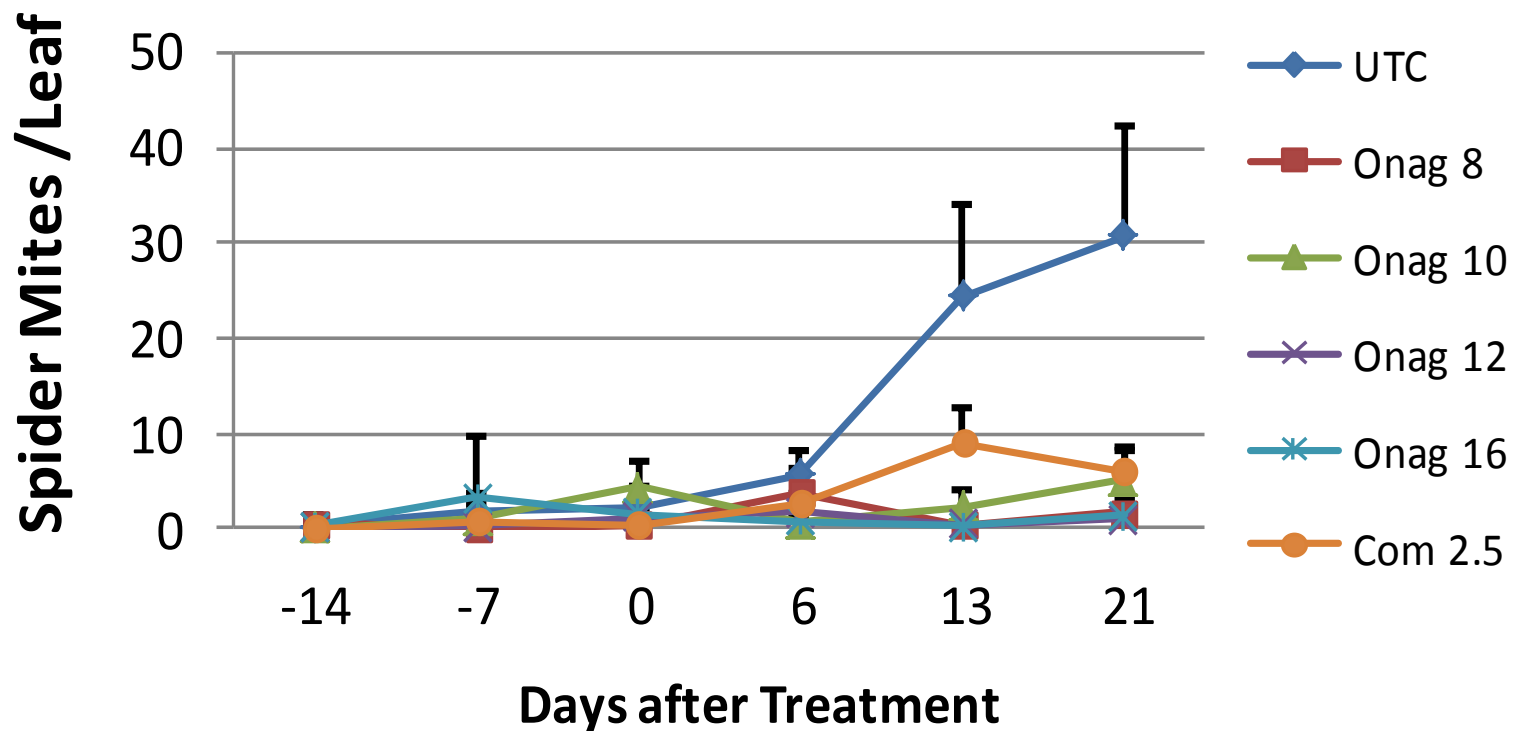
- ONAGER IS A CONTACT MITICIDE – SPRAY COVERAGE IS IMPORTANT.
- APPLY BY GROUND (CAN BE BANDED) OR BY AIR WITH SUFFICIENT CARRIER TO GIVE GOOD COVERAGE (LABEL= AIR APPLY A MINIMUM OF 10 GPA; FOR GROUND APPLY A MINIMUM OF 20 GPA.
- APPLY AT FIRST SIGN OF INVADING MITES, DO NOT WAIT FOR THE ADULT POPULATION TO BUILD.
- IF ADULT MITES ARE PRESENT IN MEDIUM TO HIGH POPULATIONS, BETTER RESULTS MAY BE OBTAINED USING ONAGER MITICIDE IN COMBINATION WITH A REGISTERED CONTACT ADULTICIDE

Onager
Miticide

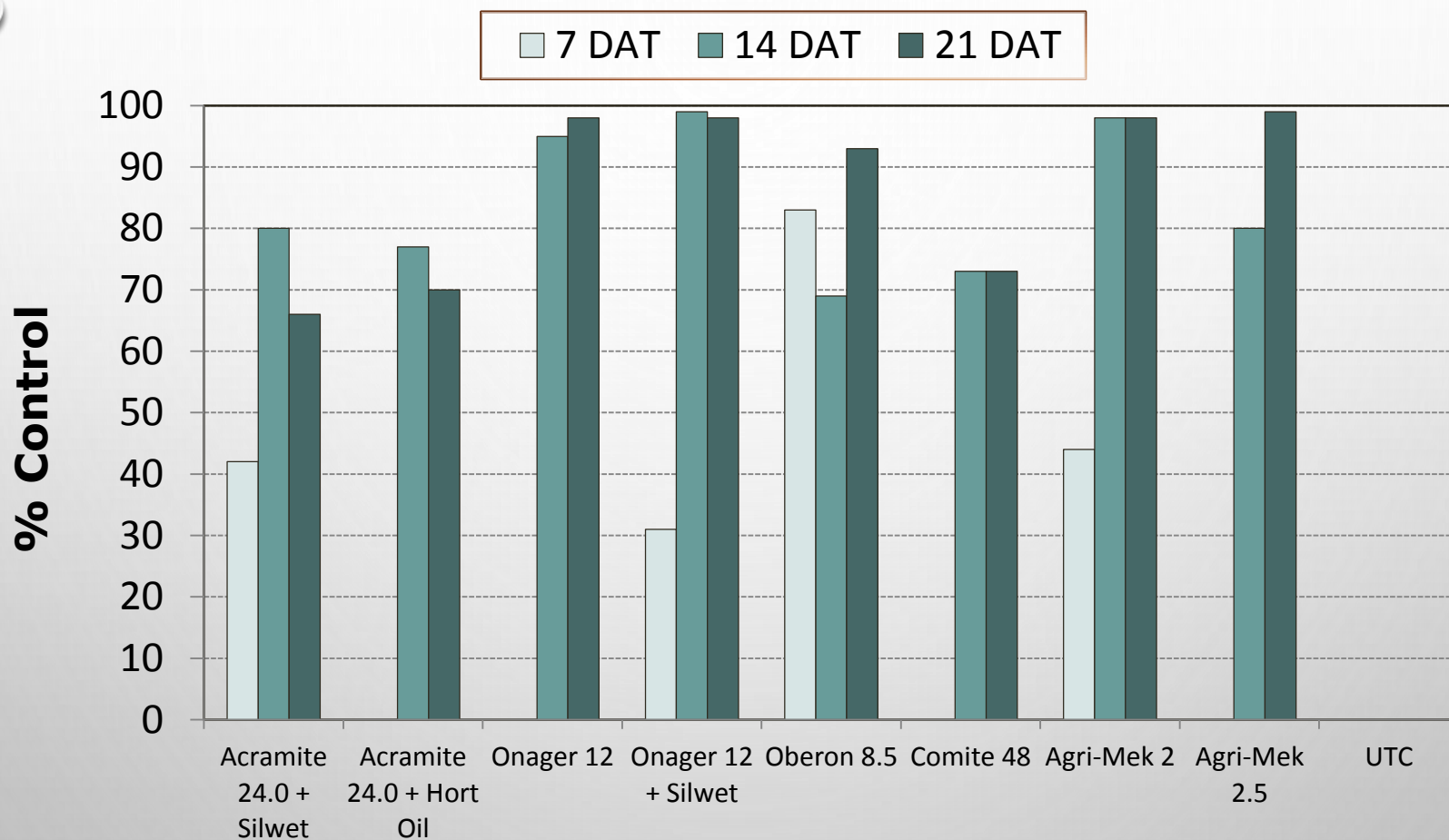
DRY BEAN TRIAL RESULTS



Mean No. of Spider Mite Motile Stages vs. Treatment
for each Sample Day

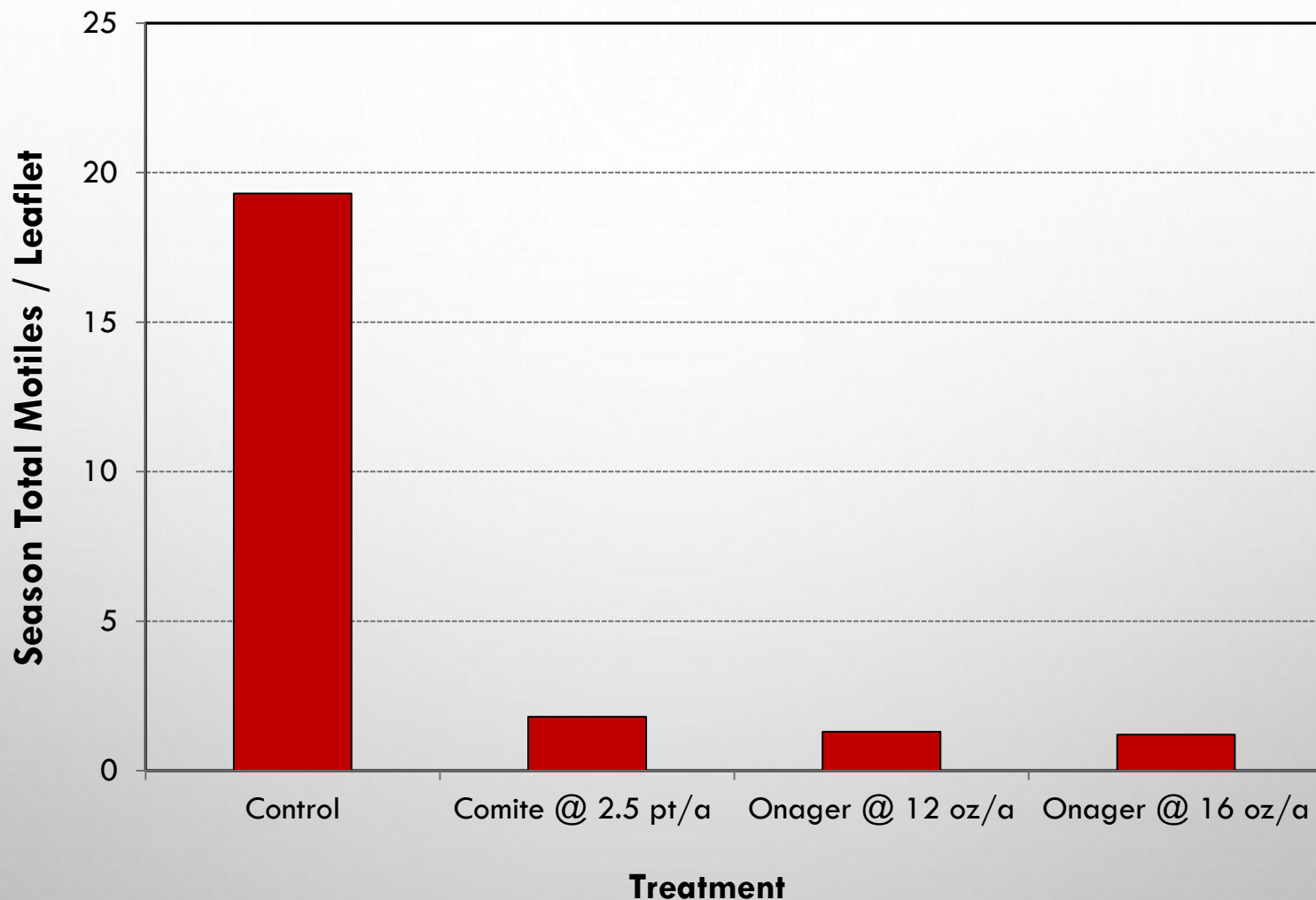


DRY BEAN TRIAL 2010



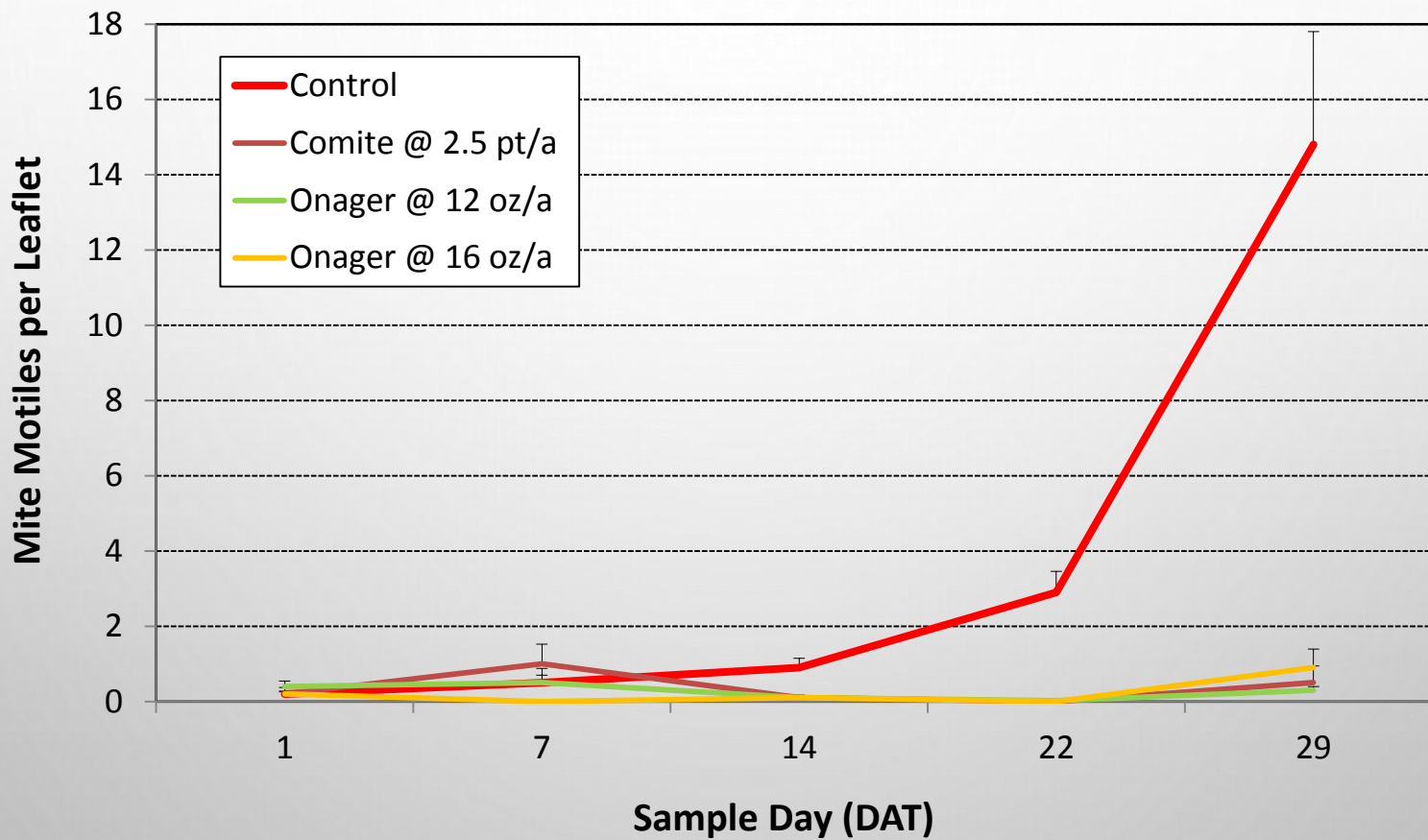
Application: 8/11/10; Rates are fl oz/A.; Silwet L-77 @ 0.12%V/V; Horticultural Oil @ 1.0%V/V; All other treatments with No Foam A @ 0.25% V/V

DRY BEAN TRIAL 2010



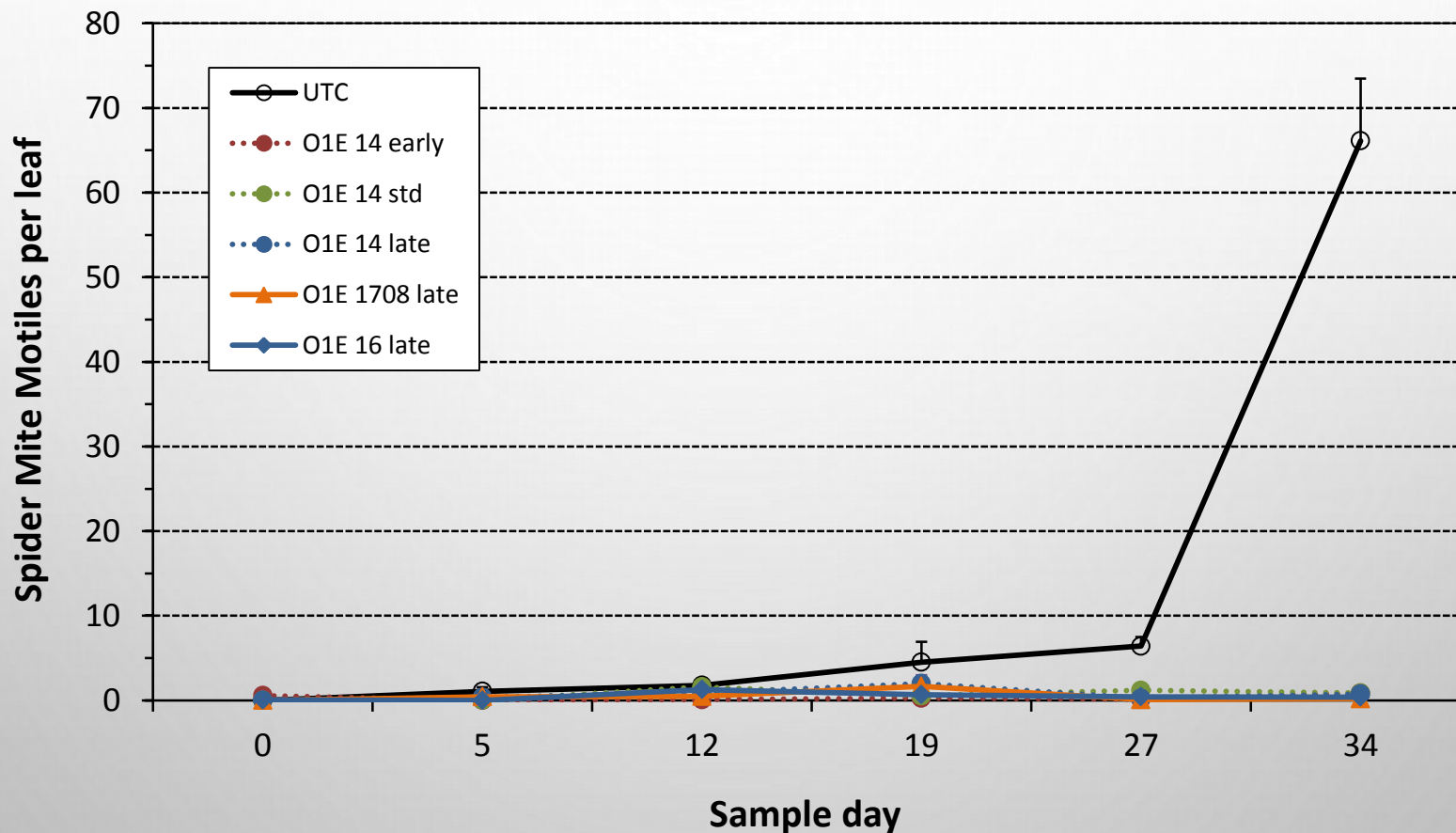
DRY BEAN TRIAL 2011

Mean (\pm SEM) no. of Spider Mites per Bean Leaflet on each Sample Day for each Treatment



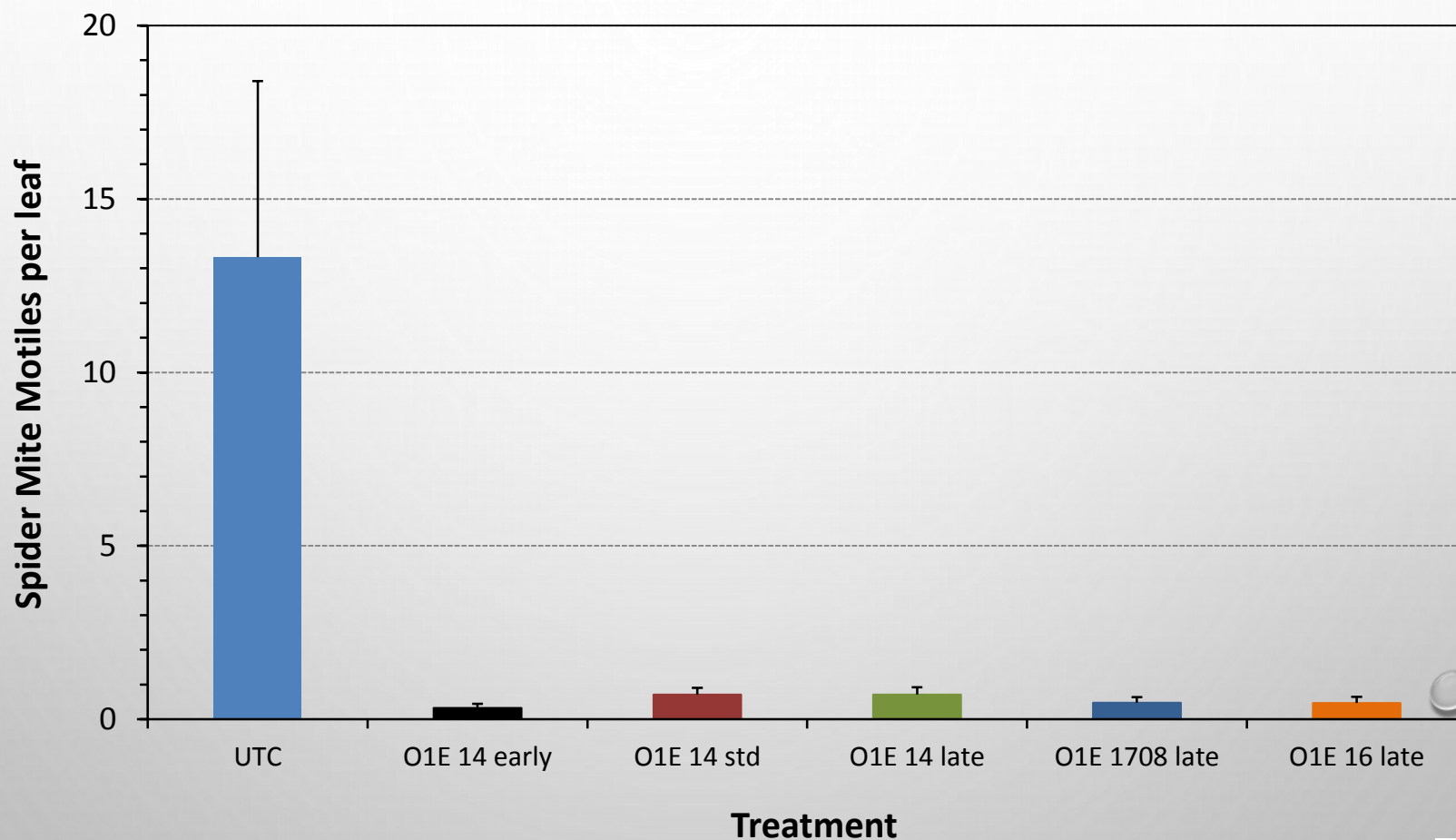
DRY BEAN TRIAL 2012

Mean (\pm SEM) number of spider mite motiles (SMM) per bean leaf for each treatment at each sample day



DRY BEAN TRIAL 2012

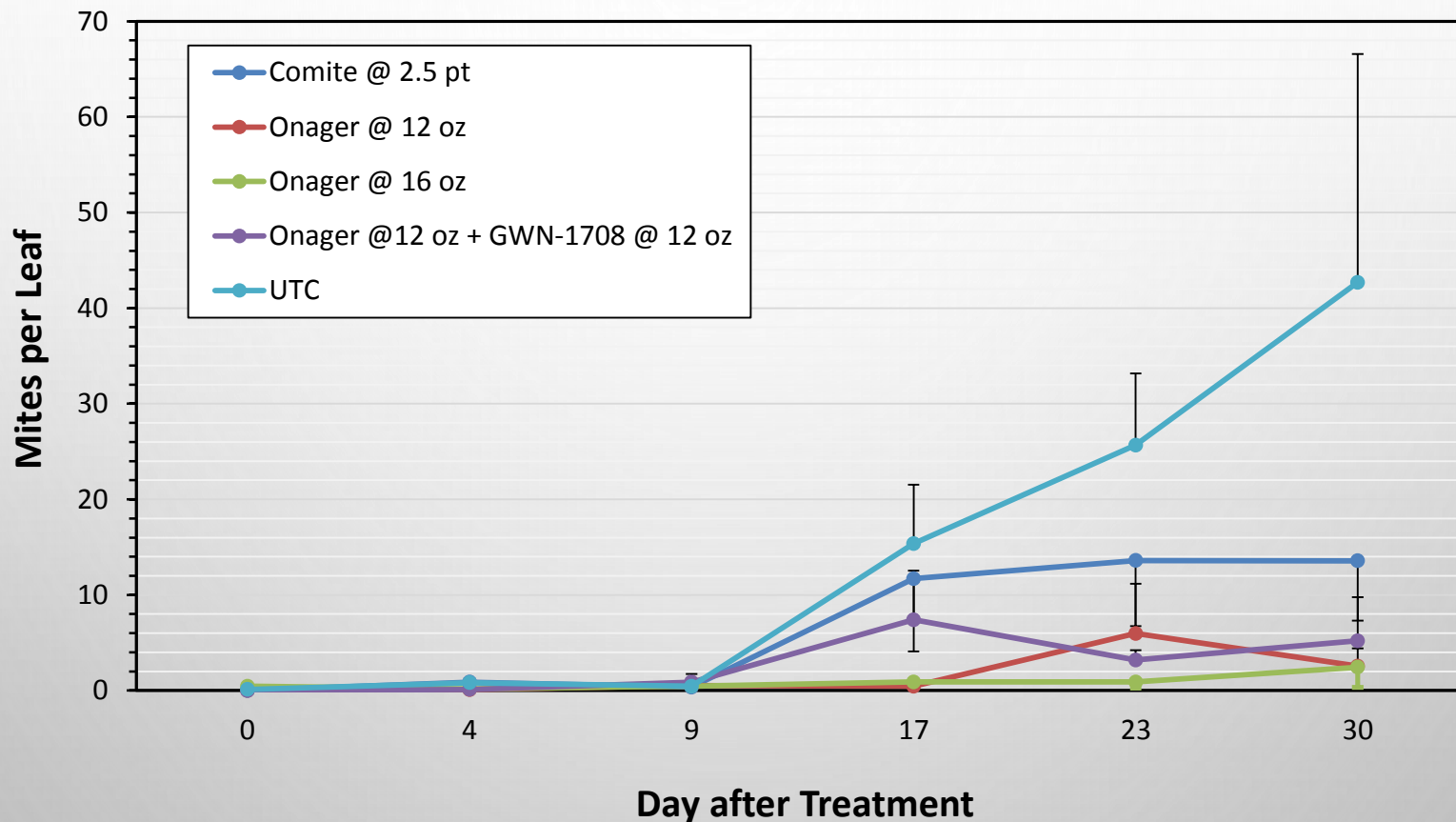
Total (\pm SEM) number of Spider Mite Motiles per Bean Leaflet over all sample days



Cooperator: Jim Barbour UIREC; **Location:** Parma, ID; **Treated:** Early= 07/11/12,
Standard= 07/19/12, Late= 07/26/12; **Harvested:** 08/28/12

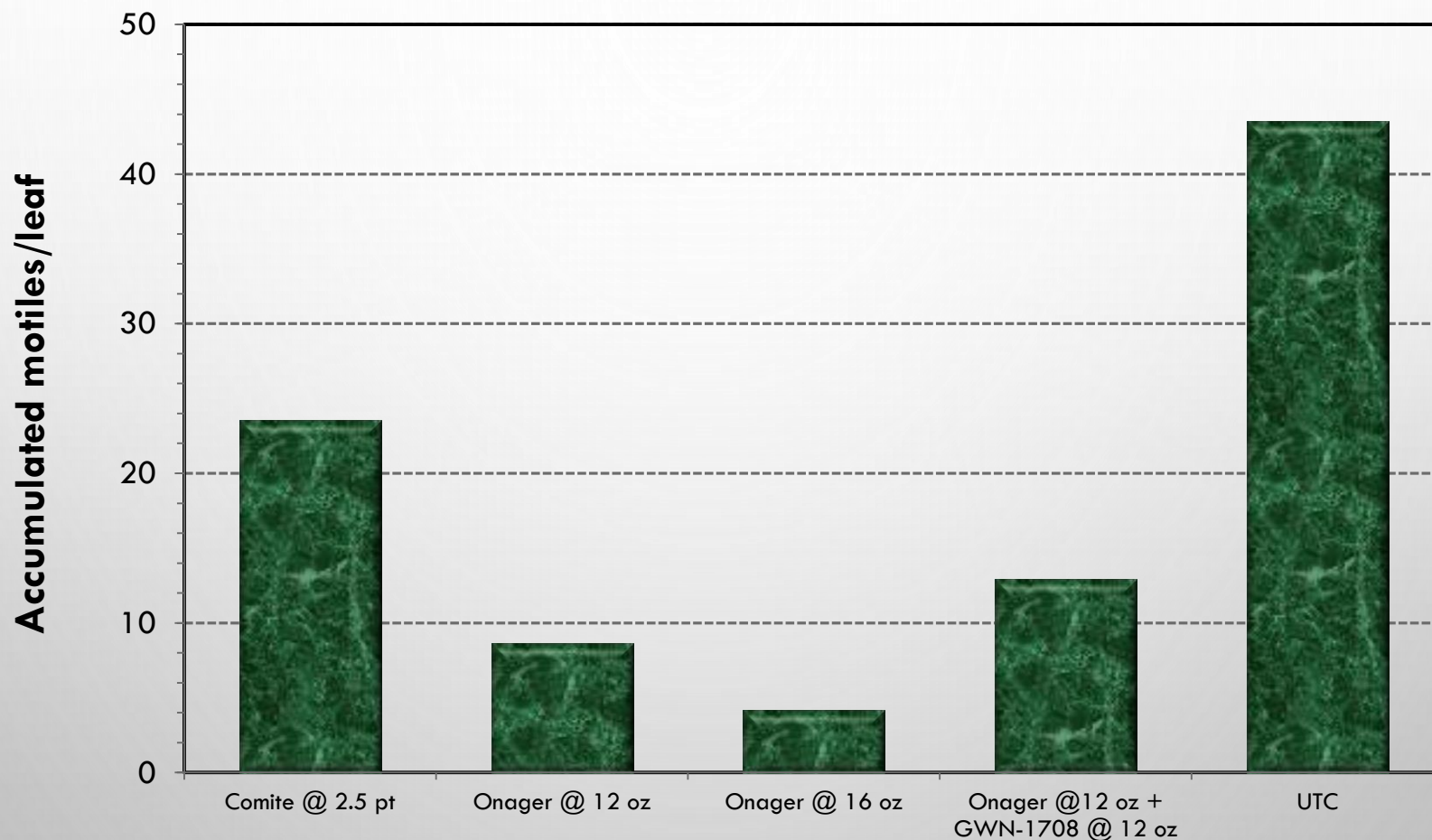
DRY BEAN TRIAL 2013

Mean (\pm SEM) number of Spider Mite Motiles per Bean Leaf for each Treatment over Sample Days



Cooperator: Jim Barbour UIREC; **Location:** Parma, ID; **Treated:** Early= 06/22/13
(ONA @ 12 & 16 oz, Late= 08/09/13 (combo & Comite));

DRY BEAN TRIAL 2013



Cooperator: Jim Barbour UIREC; **Location:** Parma, ID; **Treated:** Early= 06/22/13
(ONA @ 12 & 16 oz, Late= 08/09/13 (combo & Comite));

WHY USE ONAGER ?

- STRONG EFFICACY AND RESIDUAL CHARACTERISTICS
- PROVEN CONSISTENT PERFORMANCE
- IDEAL IPM TOOL, SAFE TO ALL BENEFICIALS
- EFFECTIVE UNDER VARIED ENVIRONMENTAL CONDITIONS.
- GREATER EFFICACY & FLEXIBILITY VS. OTHER OVICIDES.





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