New Technical Service Manager

New to the FMC Agricultural Solutions family is Brandon Schrage. Brandon was raised on a small family farm in southern Illinois with direct involvement with corn, wheat, soybean and alfalfa production. He holds advanced college degrees from Southern Illinois University, University of Arkansas and North Carolina State University as well as a certification as a North Carolina crop advisor. His experience in both Southern and Midwestern cropping systems includes herbicide resistance, insecticide-herbicide interactions and alternative control measures. Brandon has worked extensively with the herbicide-resistant weeds that plague many Great Plains growers including Palmer amaranth, marestail and ragweed, and has contributed to a number of scientific journals and societies including the Southern Weed Science Society, the American Society of Agronomy and the Weed Science Society of America.

Brandon’s responsibility as part of the Heartland technical service team is to provide sound agronomic advice to growers, sales personnel, cooperators and consultants regarding the safe and effective use of plant protection products. His work will concentrate on creating solutions for growers in Nebraska, Colorado, Wyoming and western Kansas. Some of his accomplishments are listed below. He can be reached by mobile phone at 618-792-5919 or email at brandon.schrage@fmc.com.

- Novel resistance mutations identified in common ragweed PPX2 and EPSPS genes
- Contributor to NC Soybean Growers Association production manual
- Over 40 scientific and grower presentations given
- Multiple peer-reviewed articles involving Palmer amaranth control
- Private production, contract research, academic and industry work experience
Burndown for Corn & Soybeans

Starting clean and staying clean is the only sure way to prevent resistant plants from seeding out and causing problems for the following year. Marestail can produce over 200,000 seeds annually and, with documented resistance to ALS inhibitors, glyphosate and paraquat, it pays to choose a burndown plus residual program that effectively targets small and germinating weeds.

Aim® EC herbicide provides fast activity and improves burndown performance on key weeds, including mustards, henbit, dandelion, kochia and marestail when temperatures are cool and efficacy with 2,4-D suffers. As an emulsifiable concentrate, Aim EC herbicide can also be readily mixed with glyphosate for effective control of grasses, atrazine in corn systems and Authority® brand herbicides for residual control.

Aim EC herbicide 1.0 oz/A

Corn

Aim EC herbicide 1.0 oz. + 2,4-D LV4 16 oz. + COC 1 gal./100: Fast performance, low cost treatment. No residual control. Seven-day plantback on all 2,4-D LV4 mixes up to 16 oz./A.
Aim EC herbicide 1.0 oz. + atrazine 0.75-1.5 lbs. + COC 1%: Excellent combo to heat up preemerge before or after planting. Good on mustards, lambsquarters, henbit. Add 2,4-D 8-16 oz. for marestail, dandelion, kochia.
Aim EC herbicide 0.5-0.75 oz. + Anthem® MAXX herbicide 4-4.5 oz. + atrazine 1.0-1.5 lbs. + 2,4-D LV4 16 oz. + COC1%.
  * Aim EC herbicide 0.5 oz. with Cadet® herbicide in Anthem MAXX herbicide, so lower rate of Aim EC herbicide needed.
Aim EC herbicide 1.0 oz. + 2,4-D LV4 12-16 oz. + Acuron® herbicide / Corvus® herbicide / Balance® Flexx herbicide / Resicore® herbicide + COC 1 gal./100: Fast burndown with strong control on kochia, Russian thistle, lambsquarters, mustards, marestail, etc. in the preemerge program.

Soybeans

Aim EC herbicide 1.0 oz. + 2,4-D LV4 12-16 oz. + Authority® brand herbicides + COC 1 gal./100: Strong burndown for preplant in soybeans along with residual control during the season. Seven day 2,4-D plantback.
  ➢ Close to planting, where 2,4-D is not an option, Metribuzin 75 DF @ 3-4 oz. can enhance burndown with Authority brands except Authority MTZ DF herbicide. See metribuzin label for geographic and soil restrictions on use.
  ➢ Spray coverage is critical for best burndown performance. Use 10-15 GPA minimum and flat fan nozzles. If using flood nozzles, use high pressure for good pattern and droplet breakup.

Control of marestail is improved when applications are made prior to bolting. Due to the long germination window of marestail and the eventual onset of pigweed, the addition of Authority brand residual herbicides is highly recommended.

Two days after treatment

Seven days after treatment
Authority® Brand Herbicide Treatment Options for Soybeans

### BASE RESIDUAL

1. **Authority® Elite herbicide: 25-32 oz./A**
   - Strength on small-seeded broadleaves such as kochia, lambsquarters, nightshade, waterhemp and excellent grass performance.
   - No pH or geographical restrictions. Good conventional-till product and/or as tank-mix partner.

2. **Authority® Assist herbicide: 8-12 oz./A**
   - Strength on small-seeded broadleaves like kochia, lambsquarters, nightshade, velvetleaf, waterhemp and added grass performance.
   - No pH or geographical restrictions. Good for both conventional and no-till.

3. **Authority® First DF herbicide: 5.0-6.4 oz./A**
   - Strength on small-seeded broadleaves plus marestail, giant ragweed, sunflowers and cocklebur.
   - No pH or geographical restrictions. Good no-till / reduced-till product.

4. **Authority® XL herbicide: 4.0-6.5 oz./A**
   - Strength on small-seeded broadleaves plus marestail, sunflowers and cocklebur with good cost position.
   - For soils below pH 7.6. Refer to the label for geographical restrictions.

5. **Authority® MAXX herbicide: 5.5-7.5 oz./A**
   - Same components as Authority XL herbicide but with half the amount of chlorimuron ethyl per rate for better rotational safety.
   - For soils below pH 7.6. Refer to the label for geographical restrictions.

6. **Authority® MTZ DF herbicide: 14-18 oz./A**
   - Strength on small-seeded broadleaves. Non-ALS option to help combat herbicide resistance.
   - For soils with pH 7.5 and lower due to injury risk of metribuzin.

### POST SEQUENTIAL WITH GLYPHOSATE

1. **Anthem® MAXX herbicide through V3: 2.5-4 oz./A**
   - Enhance post broadleaf i.e., Cadet® herbicide plus extended grass / small-seeded broadleaf residual control well into season.
   - “Cadillac” program; great residual addition to grass/waterhemp/nightshade programs.

2. **Marvel™ herbicide prior to R3: 6.0-7.25 oz./A**
   - Broad post broadleaf control with residual. Focused on waterhemp, velvetleaf, lambsquarters, morningglory, nightshade.
   - Geographical restrictions and rotational restrictions. See label for specific restrictions.

3. **Cadet herbicide through full flower: 0.60-0.90 oz./A**
   - Enhance post broadleaf with crop flexibility of soybeans or corn. Lambsquarters, velvetleaf, nightshade, waterhemp.
   - No pH or geographical restrictions with application time flexibility.

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There are over 560 independent herbicide-resistant weed cases in the United States. In Nebraska and Colorado, pigweed biotypes are resistant to ALS, PS2, PPO, glyphosate and HPPD herbicides. Residual herbicides followed by an effective post provide a twofold benefit. They reduce the population size of the target weed and can provide a secondary mode of action. Authority brand herbicides are still effective on PPO resistant weeds and are an important part of a multi-MOA approach to managing these weeds.
Achieving even corn emergence and stands are some of the most crucial tasks when chasing optimum corn yields. Ethos® XB insecticide/fungicide and Capture® LFR® insecticide + VGR® soil amendment provide improved early season plant health and growth above Capture LFR insecticide alone.

**Premix of bifenthrin + Bacillus amyloliquefaciens strain D747 biological fungicide in an LFR formulation.**
- Labeled for suppression of Pythium, Rhizoctonia, Fusarium and Phytophthora
- LFR formulation to mix with liquid starter fertilizers.
- Apply in-furrow at planting time for insect control plus suppression of key seedling diseases.

**In-Furrow Treatments on Corn.**

**Holyoke, CO – 2016** (Centennial Ag Supply)

<table>
<thead>
<tr>
<th>Yield (Bu/A)</th>
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<tbody>
<tr>
<td>Ethos XB insecticide/fungicide - 8.5 oz./A + 6-24-6: 4 gal.</td>
<td>246.2</td>
</tr>
<tr>
<td>Capture LFR insecticide 8.5 oz. + VGR soil amendment + 6-24-6: 4 gal.</td>
<td>241.2</td>
</tr>
<tr>
<td>Capture LFR insecticide 8.5 oz. + 6-24-6: 4 gal.</td>
<td>235.9</td>
</tr>
<tr>
<td>Untreated Check</td>
<td>230.7</td>
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</tbody>
</table>

**Capture LFR Insecticide + VGR Soil Amendment:** Co-Pack Capture LFR insecticide + Bacillus licheniformis biological.
- Spores germinate and colonize the roots resulting in increase in early season root growth and aids to solubilize phosphorus.
- VGR soil amendment, once colonized in the soil, produces metabolites associated with other benefits such as iron (Fe++) chelating.

<table>
<thead>
<tr>
<th>2016 Side-by-Side Comparison</th>
<th>Capture LFR insecticide + VGR soil amendment</th>
<th>Capture LFR insecticide alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. Central NE Avg. of two locations</td>
<td>29,512</td>
<td>26,325</td>
</tr>
<tr>
<td>W. Iowa Avg. of four locations.</td>
<td>31,500</td>
<td>28,750</td>
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**Use Rates**

<table>
<thead>
<tr>
<th></th>
<th>Seedling Pests (Wireworms, Grubs, SC maggots, Cutworms)</th>
<th>Corn Rootworms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethos XB insecticide/fungicide</td>
<td>4.0 oz./A</td>
<td>8.5 – 17.0 oz./A</td>
</tr>
<tr>
<td>Capture LFR insecticide + VGR soil amendment</td>
<td>4.0 oz./A</td>
<td>8.5 – 17.0 oz./A</td>
</tr>
</tbody>
</table>
ALFALFA INSECT CONTROL – ALFALFA WEEVILS, WORMS AND OTHER PESTS

Fast acting, novel mode of action; tough on pests, minimal impact on beneficials
- Alternative MOA vs. pyrethroid, carbamate or OP classes of insecticides for better management
- Proven oxadiazine class chemistry
- Insect stops feeding within 0-4 hours
- Long residual control: 14-21 days
- Minimal impact on most beneficial insects
- Wont flare mites
- Excellent rainfastness, approximately 2 hours
- Non-restricted use pesticide
- Easy to use EC formulation

PESTS CONTROLLED

6.7-11.3 oz./A – Alfalfa caterpillars, alfalfa weevil larvae including Egyptian alfalfa weevils, beet armyworms, grasshoppers, cabbage, loopers

9.2-11.3 oz./A – Those above plus potato leafhoppers, Western yellow striped armyworms

SPECIAL INFORMATION
- Do not apply more than 11.3 oz./A per cutting
- Do not apply more than 45 fl. oz./A per season
- Steward EC insecticide is most effective through pest ingestion of treated plant tissue so thorough spray coverage is essential for optimum control
- Minimum of 3 GPA by air or 10 GPA by ground
- Higher spray volumes of 5 GPA by air or 20 GPA by ground will provide better coverage and performance
- Chemigation application: minimum 0.1-0.2 in of water/A. See label for specific directions.
- PHI – 7 days. REI – 12 hours

FMC ALFALFA RECOMMENDATIONS

EARLY APPLICATIONS
2-4" new growth: Two MOA, broader spectrum

Mustang® Maxx insecticide 4 oz./A if weevils reappear, follow with:
Steward EC insecticide @ 6.7-11.3 oz./A at >8" new growth

EARLY TANK MIX
> 4" new growth: Two MOA, broader spectrum

Steward EC insecticide + Mustang Maxx insecticide 5.3 oz. + 4 oz./A
if weevils reappear, follow with: Steward EC insecticide 6 oz./A

ONE-SHOT PROGRAM
>10" new growth; good weevil control and IPM

Steward EC insecticide 10-11.3 oz./A + NIS or oil surfactant (use oil if applied by air)

TWO-SHOT PROGRAM
Best weevil control; low impact on beneficials

Steward EC insecticide 5.3 oz./A early fb Steward EC insecticide 6 oz./A
For broader spectrum control and two MOA, Steward EC insecticide may be tank mixed with Mustang Maxx insecticide at 4 oz./A or with Dimethoate 400EC insecticide at 0.5-1 pt./A

ALFALFA WEEVIL LARVAE COUNTS 27 DAT
(Whitworth/Schwarting – Kansas St. U., 2016)

Nontreated Stallion® Brand insecticide @ 11.75 oz. Steward® EC insecticide @ 8 oz. Steward EC insecticide @ 5.3 oz. fb Steward EC insecticide @ 6 oz.

ALFALFA WEEVIL CONTROL WITH STEWARD EC INSECTICIDE
(Kansas State University, 2015)
Ethos XB insecticide/fungicide, Capture LFR insecticide, Mustang Maxx insecticide, Stallion Brand insecticide and Atrazine are Restricted Use Pesticides. Always read and follow all label directions, precautions and restrictions for use. VGR soil amendment is not an insecticide. Some products may not be registered for sale or use in all states. The USEPA registration for Steward EC insecticide contains the following statements: This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area. As of November 1, 2017, the USEPA registrations for DuPont™ Steward® EC insecticide was sold by E.I. du Pont de Nemours and Company to FMC Corporation. FMC, Aim, Anthem, Authority, Cadet, Capture, Ethos, LFR, Marvel, Mustang, Stallion, Steward, VGR and HatchTrak are trademarks or a service mark of FMC Corporation or an affiliate. Balance and Corvus are trademarks of Bayer. Acuron is a trademark of a Syngenta Group Company. Resicore is a trademark of Dow Chemical Company ©2018 FMC Corporation. All rights reserved. 04/18