

Provisia™ Rice Production System Efficacy and Stewardship



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BASF Rice Trait Systems

- Clearfield® rice is important to the U.S. rice industry and BASF.
- Stewardship and herbicide rotation are important.
- Another herbicide site of action is important for future postemergent control of red rice, volunteer rice and “weedy rice” (ALS-resistant grass weeds).



Clearfield® Rice System

Resistance

 **BASF**
We create chemistry

- **Outcrosses**
- **F2 hybrids**
- **Weedy rice**

Provisia™ Rice System

Introduction



Newest Trait System for Red Rice, Weedy Rice, Resistant Grass Control in Rice



Provisia™
Herbicide



ACCase Inhibitor Tolerant Rice System

Field Herbicide Tolerance Trial



Untreated



1 X fb 1 X



Newpath fb Newpath

Clearfield System

New ACCase
Herbicide
Tolerant System

**Traits are not stacked
together to minimize
resistance to both traits.**

Provisia™ Herbicide

Mode of Action



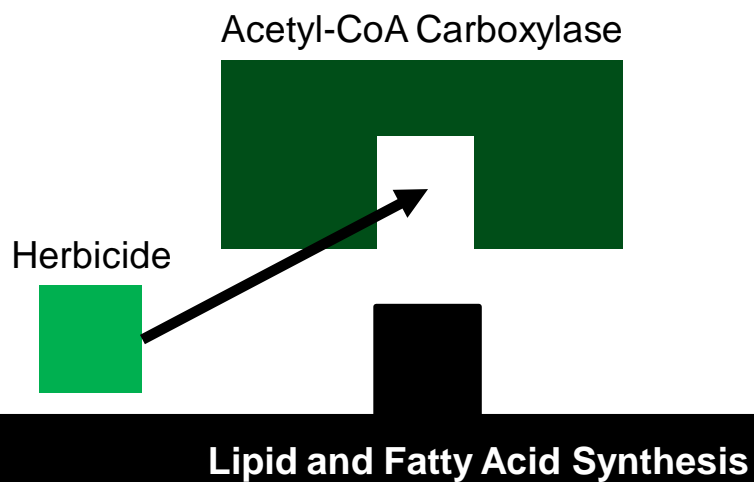
- Active Ingredient:** Quizalofop
- Chemical Family:** Aryloxyphenoxy-propionate (fops)
- Herbicide Group:** 1 (WSSA) A (HRAC)
- Mode of Action:** Lipid Synthesis Inhibitor
- Site of Action:** ACCase Inhibitor (acetyl CoA carboxylase)

Provisia™
Herbicide

Meristem Rot – Grasses
(Only grasses affected)



Boerboom, C (2005). Herbicide Mode of Action Key for Injury Symptoms. University of Wisconsin Extension. (1-6-2005-5M)



Provisia™ Rice

Seed Development



- New trait with non-GM technology
- Provisia Varieties and Hybrids being developed
- Specific disease, lodging, maturity, yield, grain quality, and other traits as per typical breeding procedure
- In mid-2015, there were 24 advanced variety lines in LSU trials
 - ▶ 2 lines look promising
 - ▶ Increased seed production this winter in Puerto Rico
 - ▶ On farm seed production planned in 2016
- Projected launch in 2017

Provisia™ Herbicide

Target Weeds



Annual Grasses

| | |
|------------------------------|-----------------------------------|
| Corn, Volunteer | <i>Zea mays</i> |
| Johnsongrass, seedling | <i>Sorghum halepense</i> |
| Shattercane | <i>Sorghum bicolor</i> |
| Fall Panicum | <i>Panicum dactyloides</i> |
| Goosegrass | <i>Eleusine indica</i> |
| Sprangletop | <i>Leptochloa spp.</i> |
| Witchgrass | <i>Panicum capillare</i> |
| Barnyardgrass | <i>Chinichloa crus-galli</i> |
| Crabgrass, Large | <i>(Digitaria sanguinalis</i> |
| Crabgrass, Smooth | <i>Digitaria ischaemum</i> |
| Junglerice | <i>Echinochloa colomum</i> |
| Texas Panicum | <i>Panicum texanum</i> |
| Red Rice | <i>Oryza sativa</i> |
| Volunteer Rice | Conventional, Clearfield, hybrids |
| Broadleaf Signalgrass | <i>Bracharia platyphylla</i> |

Perennial Grasses

| | |
|-----------------------|--------------------------|
| Bermudagrass | <i>Cynodon dactylon</i> |
| Johnsongrass, Rhizome | <i>Sorghum halepense</i> |



Provisia Rice System:

Projected Use Pattern:

- **Target Weeds:** Red rice, weedy rice, and other grasses
- **Timing:** Postemerge
 - ❖ 2 postemerge applications
 - ❖ 2 leaf to Panicle Initiation (rice)
- **Rate:** 2 applications of 100 to 140g (13-18 fl oz/A)
 - ❖ 240g (31 fl oz/A) max cumulative per season
 - ❖ Crop Oil Concentrate
- **Total Weed Control Program**
 - ❖ Preemerge herbicide
 - Residual grass & broadleaf control
 - ❖ Tank mix partners
 - Residual grass control
 - Broadleaf & sedge control

Provisia™ Herbicide Ideal Program

Two Postemerge Applications

Provisia – 1st Application*

- Pre Residual Herbicides
- 2 - 3 leaf rice*
- Rate of 13-18 fl oz/A
- Adjuvant – COC 1% v/v
- Broadleaf & Sedge TM partners (+)

Provisia – 2nd Application*

- 1-2 tillers prior to permanent flood*
- Rate of 13-18 fl oz/A
- Adjuvant – COC 1% v/v
- 10 to 21 days after first application
- Broadleaf & Sedge TM partners (?)

Provisia™
Herbicide

Provisia
Rice

Red
Rice

CL
161

Coco-
drie

CL XL
745

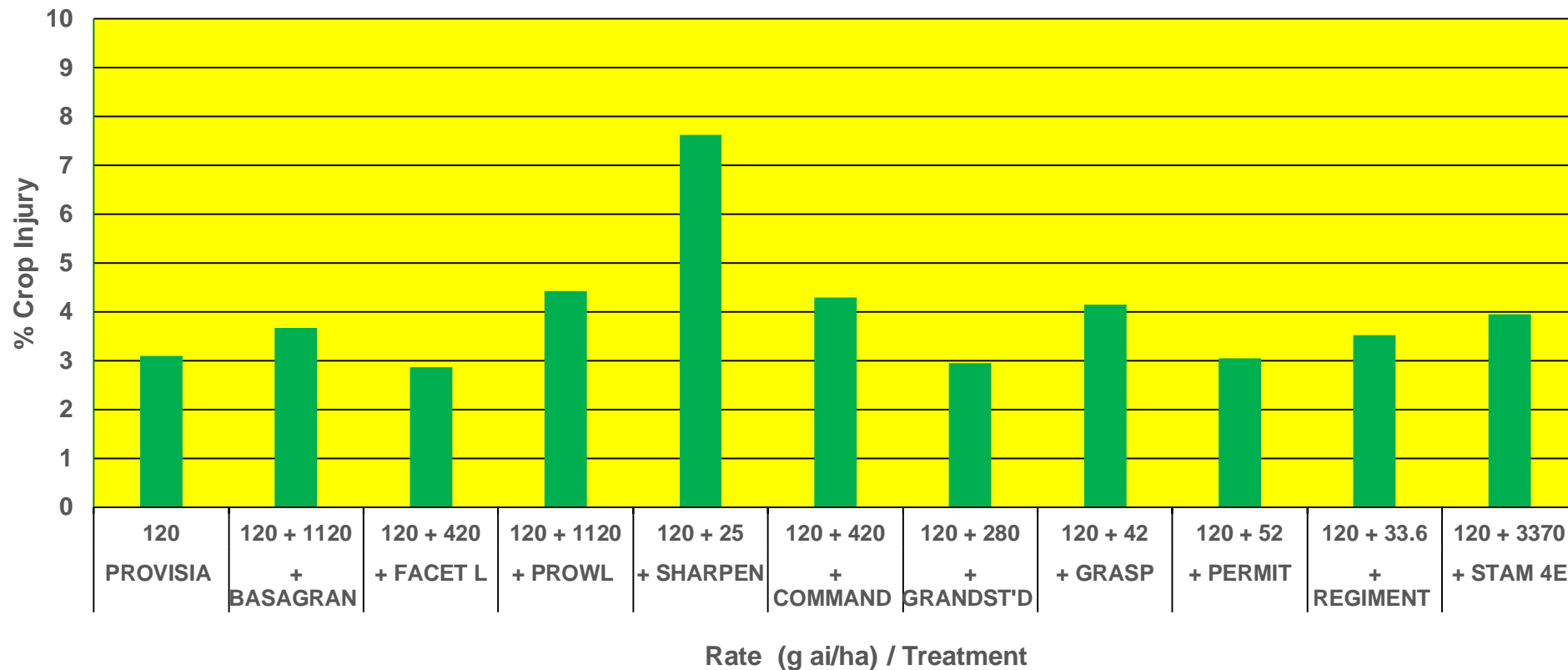
Provisia
Rice

Provisia Rice System

At labeled rates Provisia Rice very tolerant to Provisia Herbicide



Single Application; 1 WAT



6 Locations;



Provisia Injury Symptoms

Plant Response from Very High Provisia Rate



U.S. Rice Production Problem Weeds

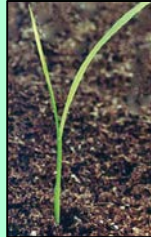
Annual Grasses



Amazon sprangletop
(*Leptochloa panicoides*)



Barnyardgrass
(*Echinochloa crus-galli*)



Red rice
(*Oryza punctate*)

Perennial Grasses



Knotgrass
(*Paspalum distichum*)



Rice cutgrass
(*Leersia oryzoides*)



Southern Watergrass
(*Luziola fluitans*)

Annual Broadleaves



Hemp sesbania
(*Sesbania herbacea*)



Texasweed
(*Caperonia palustris*)



Redweed
(*Melochia corchoriflora*)

Aquatic Broadleaves



Alligatorweed
(*Alternanthera philoxeroides*)



Ducksalad
(*Heteranthera limosa*)

Sedges & Rushes

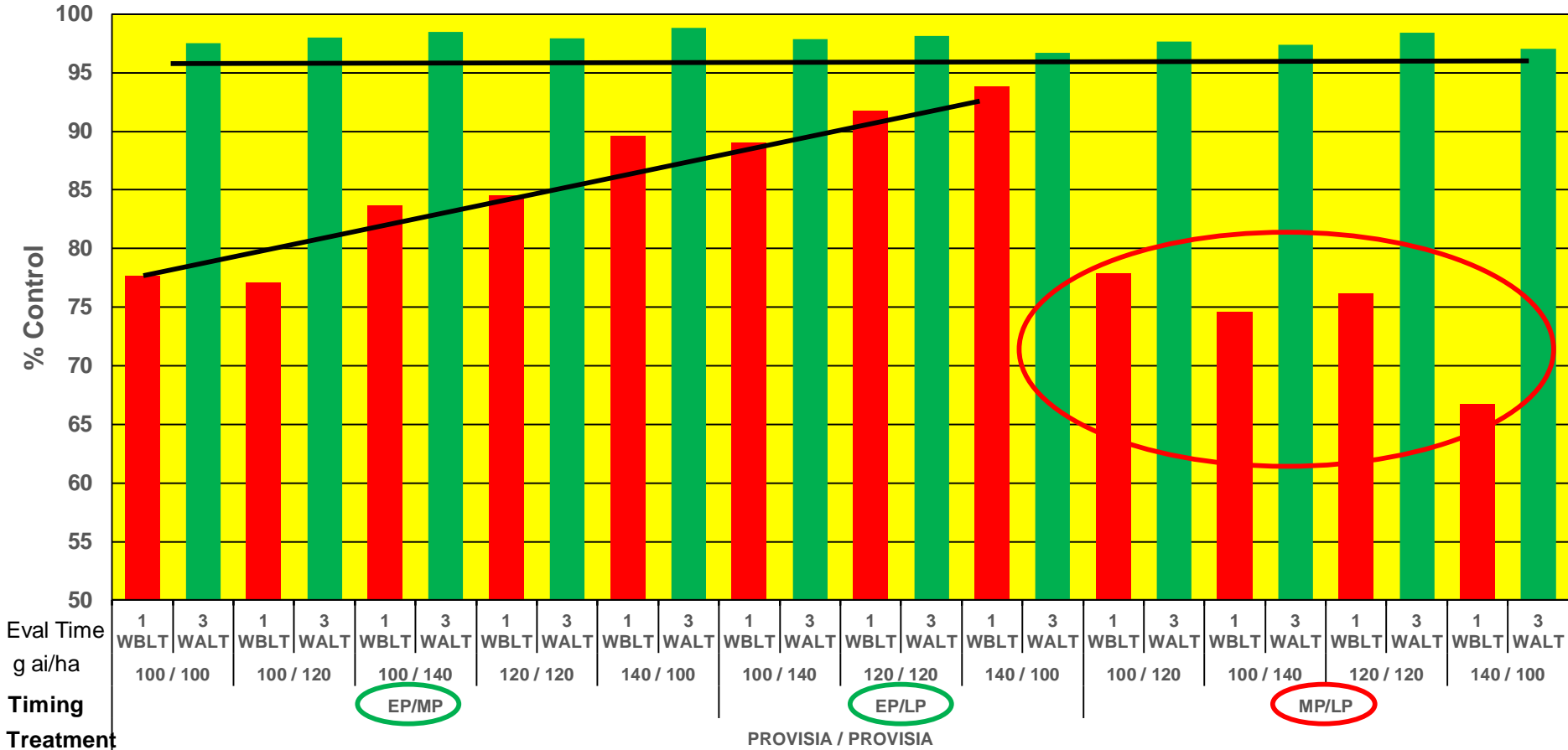


Yellow nutsedge
(*Cyperus esculentus*)



Rice flatsedge
(*Cyperus iria*)

Provisia Rice System: Weedy Rice Control / Rates & Timings



28 Locations ■ 1 Week Before Last Application ■ 3 Weeks After Last Application

Provisia Herbicide applied sequentially provided weedy rice control > 95% regardless of timings.

MP / LP timing allows for weed competition. **SMALL actively growing weedy rice is preferred**

Provisia Rice System: Efficacy Programs

Tank Mix Partners / Early Post Weedy Rice Control



10 Location

Application was Early Post / Mid Post. Weedy rice includes red rice.
 1 Week Before Last Application: Control Early Post application only
 3 Week After Last Application: Control 3 weeks after last application (flood should be established)

Provisia Rice System

Potential Tankmix Partners



- Preferred
 - Prowl EC (pendimethalin) – increased foliar activity & added residual

- Acceptable (occasional antagonism)
 - Grasp - penoxsulam
 - Permit - halosulfuron
 - Facet L - quinclorac
 - League - imazosulfuron
 - Basagran - bentazon
 - Command - clomazone
 - Regiment - bispyribac
 - Sharpen - saflufenacil

- Problematic (often antagonistic - better as sequential treatment)
 - Stam / RiceBeaux - propanil / propanil + thiobencarb
 - Grandstand - triclopyr

Provisia Rice System “Ideal Herbicide Program”



■ PREEMERGE

Command + Sharpen + Glyphosate

■ Early Postemerge – 2 leaf rice

- ▶ Provisia – 15 oz/ac with any tankmix partner for residual, broadleaf, and sedge control.....except!
- ▶ Grandstand, RiceBeaux, Stam, other propanil containing products

■ Late Postemerge – 1 tiller prior to permanent flood

- ▶ Provisia alone at 15 oz/ac + COC

2015 PROVISIA TANKMIX STUDY

Application Timing: 2-3 leaf rice
14 Days After Treatment



All treatments with 1% Crop Oil



CHECK

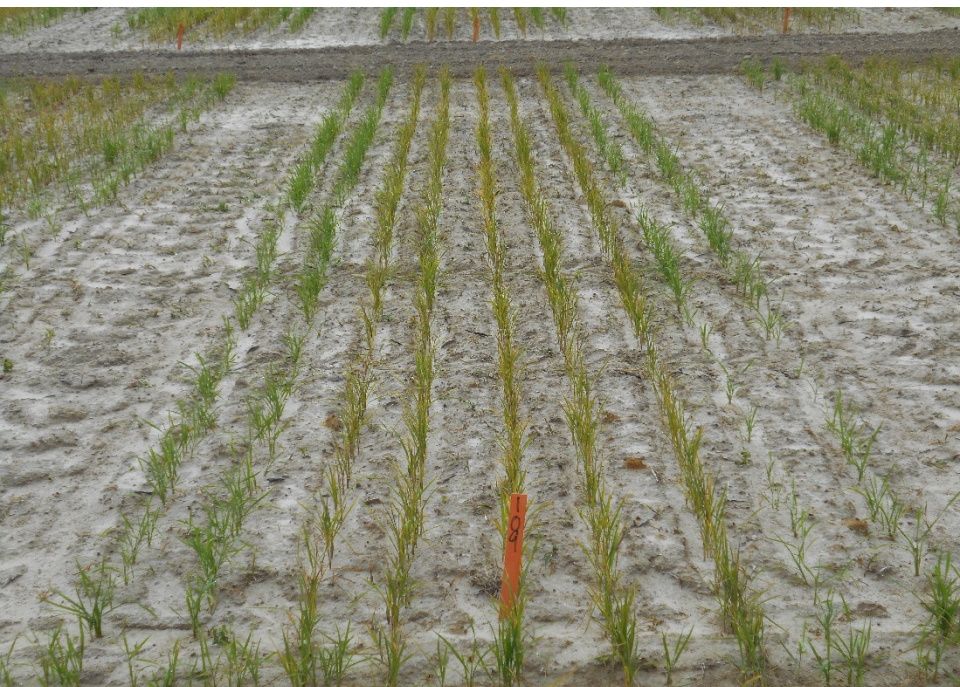


Provisia – 15 oz/ac

2015 PROVISIA TANKMIX STUDY
Application Timing: 2-3 leaf rice
14 Days After Treatment



All Treatments with 1% Crop Oil



Provisia + Permit (1 oz)



Provisia - 15 oz/ac

2015 PROVISIA TANKMIX STUDY
Application Timing: 2-3 leaf rice
14 Days After Treatment



All Treatments with 1% Crop Oil



Provisia + Facet L (32 oz)



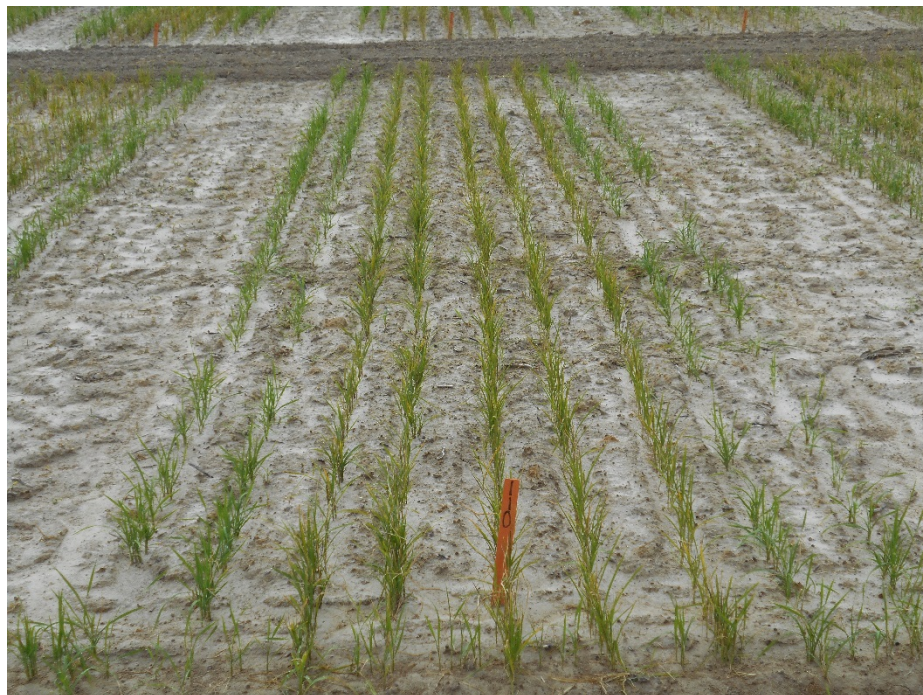
Provisia - 15 oz/ac

2015 PROVISIA TANKMIX STUDY

Application Timing: 2-3 leaf rice
14 Days After Treatment



All Treatments with 1% Crop Oil



Provisia + Duet (3 qt)



Provisia – 15 oz/ac

2015 PROVISIA TANKMIX STUDY

Application Timing: 2-3 leaf rice
14 Days After Treatment



All Treatments with 1% Crop Oil



Provisia + RiceBeaux (3 qt)



Provisia - 15 oz/ac

2014 PROVISIA TANKMIX STUDY - TX
Application Timing: 2-3 leaf rice
9 Days After Treatment
AgGro Innovations, LLC

All Treatments with 1% Crop Oil



Provisia + RiceBeaux – 9 DAT

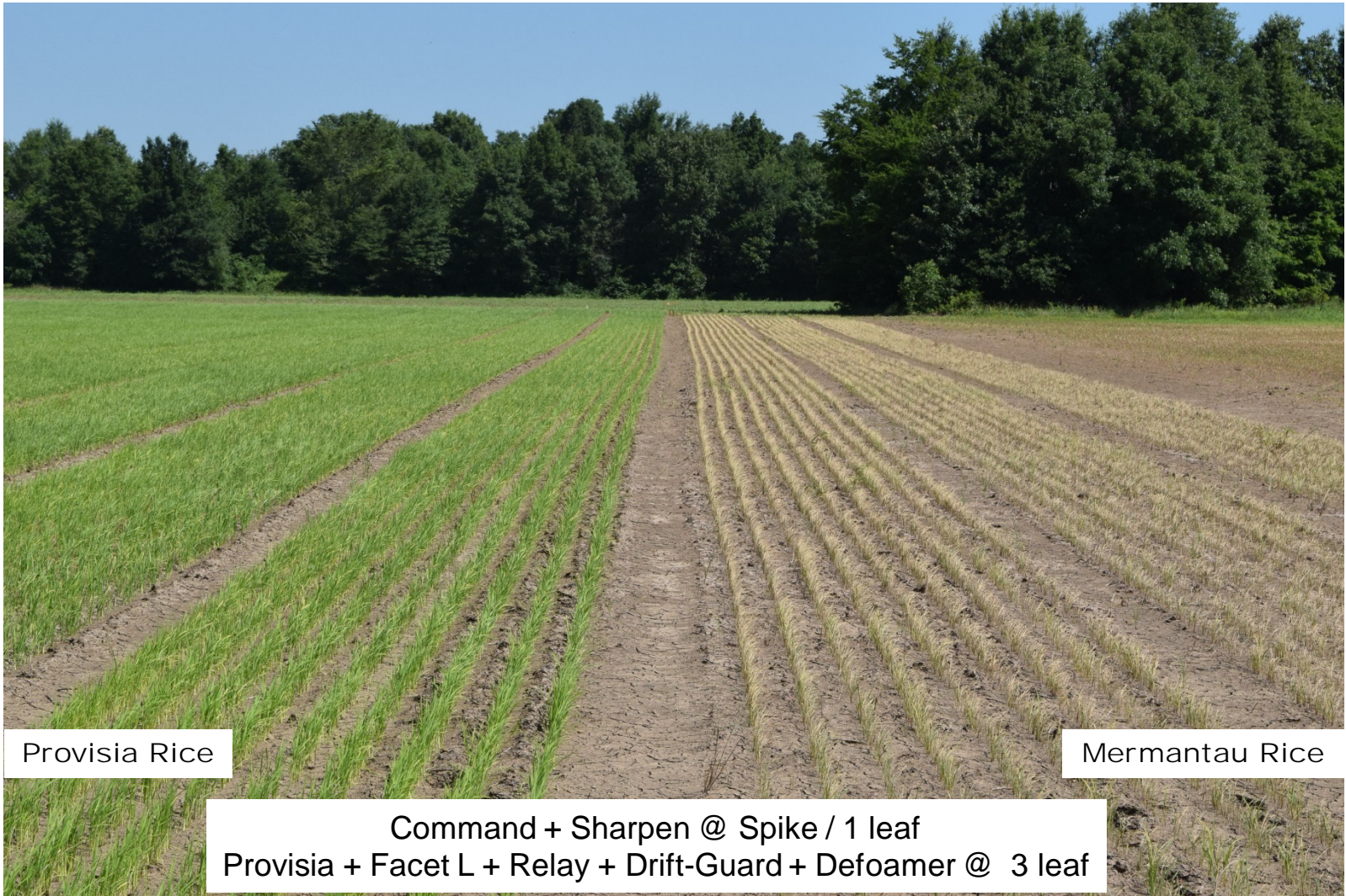
2014 PROVISA TANKMIX STUDY
2 Applications: 2 lf & 1-2 tiller
13 DALT

All Treatments with 1% Crop Oil



Provisa (13 oz) + RiceBeaux (4 qts) fb Provisia (13 oz)

Provisia Herbicide Aerial Application 7 Days After 1st Application



Provisia Rice

Mermantau Rice

Command + Sharpen @ Spike / 1 leaf
Provisia + Facet L + Relay + Drift-Guard + Defoamer @ 3 leaf

Clearfield® Rice Production System and Provisia™ Rice Production System Stewardship Guidelines



- Purchase registered IMI herbicides through BASF authorized retailer
- Purchase registered / certified seed from authorized Clearfield seed retailer
- Make a minimum of 2 applications of the registered IMI herbicides
- Follow good agronomic production practices during the season
- Purchase registered Provisia herbicides through BASF authorized retailer
- Purchase registered / certified seed from authorized Provisia seed retailer
- Make 2 applications of Provisia herbicide (not to exceed maximum rates)
- Follow good agronomic production practices during the season

Clearfield[®] Rice Production System and Provisia[™] Rice Production System Stewardship Guidelines



■ Crop Rotation

- ▶ Do not plant Clearfield rice in consecutive years
- ▶ Use non ALS herbicides in rotational crop for red / weedy rice control
- ▶ Fallow rotation should be treated with glyphosate fb tillage
- ▶ Do not allow any rice to go to seed in a non rice year

■ Crop Rotation

- ▶ Do not plant Provisia rice in consecutive years
- ▶ Use non ACC-ase herbicides in rotational crop for red / weedy rice control
- ▶ Fallow rotation should be treated with glyphosate fb tillage
- ▶ Do not allow any rice to go to seed in a non rice year

Provisia™ Rice System

Stewardship – Possible Crop Rotation



Year 1

Soybeans



GMO Broadleaf,
No ALS,
No ACCase



Use a residual herbicide for red rice and grass control.

Year 2

Provisia Rice



DO NOT plant Provisia rice in consecutive years in the same field.

Year 3

Clearfield Rice*



DO NOT plant Clearfield rice in consecutive years in the same field.

*or other crop options



Provisia™ Rice System

Stewardship – Possible Crop Rotation



Year 1, 3, & 5

Provisia Rice



Use a residual herbicide for red rice and grass control.

Year 2, 4, & 6

Soybeans



DO NOT plant Provisia rice in consecutive years in the same field.

*NO ACCase in soybeans

Provisia Rice

- Summary

- Provisia Rice provides growers an option for the control of volunteer weedy rice, red rice and annual grasses. Launch projected for 2017.
- Provisia Herbicide use rate: 100 – 140 g a/ha (13 – 18 fl oz/A) sequentially; not to exceed 240 g a/ha (31 fl oz/A)
- Provisia Herbicide applied Early Post to small actively growing grasses is the most effective timing and reduces weed competition
- Sequential application is essential for complete weedy rice control
 - ▶ Mid Post is preferred over Late Post
 - ▶ Tankmix partners for residual grass, broadleaf, and sedge control
- Stewardship of the Provisia rice trait will be very similar to that of the Clearfield rice trait.
- Rotations of Provisia rice, Clearfield rice, and soybean provides sustainability of the Clearfield and Provisia trait and production systems.

Provisia Rice Advisory Board

March 8-9, 2016



- University Rice Researchers from LA, MS, TX, AR, MO
- Review research
- New research ideas
- Stewardship
- Assist in launch of Provisia Rice

- Provisia Herbicide is not registered or available for sale. Information contained in this presentation is intended for educational purposes and is not intended to promote the sale of the product.
- Any sale of this product after registration is obtained shall be solely on the basis of an EPA approved label. Any claims regarding product safety and efficacy shall be addressed solely by the label.



We create chemistry