CLEARFIELD® RICE STEWARDSHIP
Maximum Outcrossing Rate and Genetic Compatibility between Red Rice (Oryza sativa) Biotypes and Clearfield™ Rice


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OBJECTIVE & METHODS

Variability in maximum outcrossing rate between 12 red rice biotypes and Clearfield 161.

- 7 STRAWHULLS, 3 BLACKHULLS, 2 BROWNHULLS
- Red rice biotypes planted in the middle row of nine row CL 161 plots
- The flowering duration of all red rice biotypes ranged from 5 to 16 days after the onset of flowering in contrast to 6 days for CL 161.
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RESULTS

- 10 of 12 red rice biotypes had equal to or greater than 70% overlap in flowering with CL 161.
- The maximum field outcrossing rate between red rice biotypes and CL 161 ranged from 0.03 to 0.25%.

CONCLUSION

- Low outcrossing rate between cultivated rice and red rice because of genetic compatibility, floral morphology, & pollen production.
Natural hybridization between rice and weedy rice occurs at relatively low frequencies because *Oryzae* is a primarily self-pollinated species (Khush 1997).

The outcrossing rate between cultivated rice and red rice is generally <1%, about 200 herbicide-resistant plants ha could still be produced after the first year of planting CL rice (Shivrain et al. 2007).

However, this varies widely due to the great diversity in red rice biotypes....... (Shivrain et al. 2007)
Take Home Message – Clearfield rice acres increase the degree of outcrossing increases!!

60% OF RICE ACRES COULD BE CLEARFIELD IN 2009!!
Sections

1. In Season CLEARFIELD® Rice Production

2. Crop Rotation Following Planting CLEARFIELD Rice

3. Fields With Outcrossed Red Rice Plants
1. In-Season CLEARFIELD® Rice Production

- Start clean – utilize a burndown herbicide at planting.
  - Introduces a different MOA
- Plant CLEARFIELD rice according to seed company recommendations for best cropping practices.
  - Good stand is more competitive
- Apply a residual herbicide, such as Prowl® H₂O, Delayed Pre-emergence, to increase grass control.
  - May also give some residual control of red rice?
1. In-Season CLEARFIELD® Rice Production

◆ Apply 2 applications of Newpath® herbicide as labeled. Do not skip 2nd application of Newpath. The 2nd application provides residual for extended weed control.

◆ In the rare (hopefully) case you can not do this USE BEYOND POSTFLOOD

◆ Water management:
  - Flush within 2 days of first application.
  - Initiate permanent flood within 2 days of second application or as soon as the growth stage of the rice permits.
  - Maintain good soil moisture until permanent flood.
1. In-Season CLEARFIELD® Rice Production

- Maintain weed-free levees and red rice free ditches and turn rows.
- Treat with Beyond® herbicide to control escaped red rice at a proper growth stage according to Beyond label.
  - Don’t wait until red rice is headed!
- Rogue for red rice escapes.
  - Generally not practical, but if there is only one or two red rice plants remaining ............get your BIG BEHIND OUT OF THE TRUCK
- DO NOT ratoon rice crop if red rice is present at harvest, regardless of plans to harvest or utilize as habitat.
- Roll and flush CLEARFIELD rice fields after harvest to promote germination of weeds in the fall.
- DO NOT till field in the fall. Unburied seed in the fall will have lower survival than seed buried by tillage.
APPLY BEYOND BEFORE FULL BOOT
Skips and Misses

RETREAT WITH BEYOND TO PREVENT SEED PRODUCTION
TOP 5 PRACTICES TO PREVENT OUTCROSSING

1. **DO NOT PLANT CLEARFIELD RICE IN CONSECUTIVE YEARS IN THE SAME FIELD**
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4. **DO NOT PLANT CLEARFIELD RICE IN CONSECUTIVE YEARS IN THE SAME FIELD**
5. **DO NOT PLANT CLEARFIELD RICE IN CONSECUTIVE YEARS**
Or, Your farm could end up LIKE THIS
2. Crop Rotation Following Planting CLEARFIELD® Rice

- **DO NOT** plant CLEARFIELD rice in consecutive years in the same field.

- Rotate to another crop such as Roundup Ready® soybeans or corn and use alternate herbicide mode of action for red rice control.

- In rotational crop use a residual herbicide for red rice and grass control, such as Outlook® or Dual Magnum® and Dual II Magnum®. **DO NOT** use an ALS herbicide as the primary residual herbicide.

- In late germinating red rice is present in a Roundup Ready crop prior to canopy closure, an application of Roundup is recommended. A non-ALS herbicide should also be used to control red rice and other grasses in soybeans just prior to canopy closure.
2. Crop Rotation Following Planting CLEARFIELD® Rice

- DO NOT grow crawfish following CLEARFIELD rice (plant non-CLEARFIELD rice for use in crawfish fields).

- DO NOT fallow fields following CLEARFIELD rice without repeated field tillage or glyphosate treatments to control volunteer red rice.

- DO NOT allow any red rice to go to seed in non-rice year. This includes any fallow or crawfish production fields.

- When practical, cultivate all rotational crops regardless of herbicide program.
Fallow field following CLEARFIELD® rice
DON’T LET THIS RICE GO TO SEED
3. Fields with Volunteer Rice With ALS Herbicide Tolerance

- DO NOT PLANT RICE FOR AT LEAST TWO YEARS.
- DO NOT allow any rice to go to seed.
- Plant an alternate crop such as Roundup Ready® soybeans or corn, for two or more years.
- Use a non-ALS herbicide, such as glyphosate, Outlook® or Dual® to control red rice or other ALS-resistant weeds.
- Use cultivation to control red rice.
- Rogue all suspect outcrossed plants to prevent seed production.
Requirements: CLEARFIELD® Production System for Rice

• Growers must sign a current planting year BASF CLEARFIELD Rice Stewardship Grower Agreement in order to purchase CLEARFIELD rice seed.

• Growers must purchase certified CLEARFIELD rice seed to produce a single commercial crop.

• When the grower uses an imidazolinone herbicide, the grower agrees to use Newpath® herbicide, Clearpath® herbicide, Beyond® herbicide, or other labeled BASF-branded or BASF-approved herbicide containing an imidazolinone in accordance with the product label.
NO HERBICIDE SILVER BULLET ON THE HORIZON

If we don’t practice stewardship……..

➢ Lose technology on individual farms
➢ May lose technology for industry