

► Weedy Rice Management Employing A Long Term Rotation

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Clearfield hybrid rice (*Oryza sativa* L.) was introduced in 2003, and is resistant to the imidazolinone family of herbicides. Newpath and Beyond are the two herbicides labeled for use on Clearfield rice in the United States. Hybrid rice seed has a history of dormancy, and it can become a weedy plant if allowed to establish the following growing season as an F2. Clearfield F2 plants can vary in phenotype and are often resistant to imazethapyr and imazomox. These resistant F2 plants can become a tremendous weed problem when Clearfield hybrid rice is grown in consecutive years. Another problem with the Clearfield rice technology is outcrossing potential of Clearfield rice with red rice (*Oryza sativa* L.).

A producer location was identified in 2008 near Esterwood, Louisiana with a history of 3 consecutive growing seasons of Clearfield hybrid rice production. This location was determined to have both weedy hybrid and red rice outcrosses. A long term study was established in 2009 through 2012 to evaluate four different rotations to better determine the best management practices for managing weedy rice plants. The rotations used were: 1) Roundup Ready soybean followed by (fb) Clearfield hybrid rice fb Roundup Ready soybean fb Clearfield hybrid rice; 2) Roundup Ready soybean fb Roundup Ready soybean fb Roundup Ready soybean fb Clearfield hybrid rice; 3) fallow fb fallow fb Roundup Ready soybean fb Clearfield hybrid rice; 4) fallow fb Clearfield hybrid rice fb Roundup Ready soybean fb Clearfield hybrid rice. The herbicide programs and cultural practices were consistent across a given rotation.

In 2009, the field was divided into two 1 acre blocks. One block was planted to Roundup Ready soybean and treated with Roundup at 1 qt/A plus Outlook at 18 oz/A in the first trifoliate leaf stage. A second application of Roundup at 1 qt/A was applied at 14 to 21 days later. The area was maintained weed free. A second 1 acre block remained fallow and was treated twice with Roundup at 1qt/A and fb tillage 14 days after each Roundup application. Both 1 acre blocks were maintained weed-free in order to prevent added seed to the seed bank. In 2010, each 1 acre block was further divided into 0.5 acre blocks following the previously described rotation scheme.

Clearfield rice was treated with 6 oz/A of Newpath fb Newpath at 6 oz/A 14 days later fb 5 oz/A of Beyond at panicle differentiation. Weedy rice plants were counted in each 0.5 acre block planted to rice. The soybean/rice rotation had 2.5 weedy rice plants/m² and the fallow/rice rotation had 6.5/m². This indicates that the use of the Roundup Ready soybean rotation helped reduce the weedy rice population. In 2011, the area was planted to Roundup Ready soybean and treated as previously described. At harvest there was no weedy rice plants observed. In 2012, the entire area was planted to Clearfield hybrid rice and treated as previously described. The total number of weedy rice plants was obtained and an average/m² was determined. The rotation scheme of soybean/soybean/soybean/rice reduced the total number of weedy rice plants to 37 plants, or 0.018 plants/m². The fallow/fallow/soybean/rice rotation reduced weed rice plants to 73 plants, or 0.036 plants/m², and the soybean/rice/soybean/ rice rotation resulted in 860 weedy rice plants, or 0.43 plants/m². The highest population, 1840 plants, or 0.909 plants/m² was observed with the fallow/rice/soybean/rice rotation.

In 2013, another long term study was established consisting of five different rotations. The same size blocks were established, 0.4 ha. The rotations used were: 1) Roundup Ready Soybean (2013)/Provisia Rice (2014)/Roundup Ready Soybean (2015)/Clearfield Hybrid Rice (2016); 2) Fallow (2013)/Provisia Rice (2014)/Roundup Ready Soybean (2015)/Clearfield Hybrid Rice (2016); 3) Clearfield Hybrid Rice (2013)/Liberty Link Soybean (2014)/Provisia Rice (2015)/Clearfield Hybrid Rice (2016); 4) Roundup Ready Soybean (2013)/Liberty Link Soybean (2014)/Roundup Ready Soybean (2015)/Clearfield Hybrid Rice (2016); 5) Roundup Ready Soybean (2013)/Clearfield Hybrid Rice (2014)/Roundup Ready Soybean (2015)/Clearfield Hybrid Rice (2016). However, rotation 4 received Roundup at 1qt/A plus Outlook at 18 oz/A plus Zidua at 2.5 oz/A at the first trifoliate leaf stage in 2013 and 2014. Prior to rice harvest weedy rice plant counts were determined. In 2013, weedy rice plants for each rotation were: rotation 1 - 17.2 plants/m²; rotation 2 - 25.1 plants/m²; rotation 3 - 0.3 plants/m²; rotation 4 - 5.2 plants/m²; rotation 5 - 7.8 plants/m². This research indicates that long term crop rotation, herbicide rotation, and employing different production practices can be used to manage weedy rice plants. In 2014, weedy rice weedy rice plants for each rotation were: rotation 1 - 0.005 plants/m²; rotation 2 - 0.002 plants/m²; rotation 3 - 2.6 plants/m²; rotation 4 - 3.1 plants/m²; rotation 5 - 39.6 plants/m².