

1 TITLE: Identifying and classifying potential red rice hybrids from farm fields through DNA
2 fingerprinting (2005 summary: year 2 of a 3-year project).

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7 Rice and red rice are primarily self-pollinated, but can intercross at low rates. Since the
8 introduction of IMI-resistant rice cultivars in the U.S. in 2002, interest in the dynamics of
9 intercrossing between rice and red rice has increased. We have continued collecting 'suspected'
10 red rice hybrids from grower fields, including late summer samples acquired from Monroe,
11 Mississippi, Prairie, and Randolph Counties, and have continued field observations and DNA
12 analysis of plants previously collected from numerous Arkansas counties. Seeds from
13 'confirmed' red rice crosses obtained from Jackson County in 2004 were planted in the field in
14 2005 to evaluate their segregation via the phenotypic characteristics of the second generation
15 plants. One hundred seeds of the six hybrids were planted in the greenhouse and 40 seedlings
16 were transplanted in the field three weeks later. Seedlings of Wells, CL 161, Stuttgart strawhull,
17 and a blackhull red rice type were also transplanted for comparison. Although SSR marker
18 analysis is incomplete, phenotypic characteristics of most plants are consistent with the
19 hypothesis that the original 'confirmed' crosses were indeed first generation hybrids between
20 Clearfield rice and red rice (i.e. second generation plants exhibited a broad range of plant types).
21 Another set of 'confirmed' hybrids have been planted and sprayed with imazethapyr in the
22 greenhouse to test for resistance (survival). Determination of outcrossing from red rice and rice
23 planting pairs from 2000 to 2004 were conducted in the field and/or greenhouse in 2005.
24 Seedlings from pairs with Clearfield rice were sprayed with imazethapyr to identify resistant
25 plants (survivors). Analysis of DNA from leaf tissues of the survivors is underway. For non-
26 herbicide resistant rice and red rice pairs, seedlings were allowed to grow to the seed production
27 stage in the field or greenhouse. Plants exhibiting specific hybrid characteristics were always tall
28 plants with rough leaves including a) pink-awned or purple stemmed plants in rice or red rice
29 plots (for awned red rice hybrids); or b) awnless, late-flowering plants in rice plots (for awnless
30 red rice hybrids) and were tentatively identified as first generation red rice hybrids. Estimated
31 outcrossing rates with red rice as pollen donor ranged from 0.05% (Starbonnet / STGB blackhull
32 red rice in 2000) to 0.33% (Kaybonnet / #8 blackhull red rice in 2003). Similarly, when awnless
33 strawhull red rice, STGS, served as a pollen donor for crosses with Clearfield rice (CL121,
34 CL161, and CL0051), outcrossing rates averaged about 0.07%. Outcrossing rates with rice as the
35 pollen donor were much lower than the above rates, confirming that outcrossing from tall red
36 rice to shorter rice typically is greater than in the reverse direction. DNA analyses are underway.
37 These studies exemplify how we can use visual observation and SSR analysis to identify,
38 understand and potentially mitigate the consequences of outcrossing between rice and red rice.
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