LOSS OF RED RICE SEED DORMANCY IN RESPONSE TO FALL FLOODING AND BURIAL DEPTH.

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ABSTRACT

Red rice (*Oryza sativa* L.) is one of the most problematic weeds in rice production in many regions of the Southern United States. Red rice seeds show a variable level of dormancy which contribute to its persistence in the soil seed bank. Duration of dormancy varies according to the populations and seed storage conditions after dispersion. Seed longevity seems to be not correlated with degree of dormancy, but many studies show to contrasting results. Several environmental factors can affect seed longevity such as soil depth and soil moisture, but also the seed characteristics play an important role. The aim of the study was to investigate the loss of red rice dormancy and seed longevity of 6 red rice populations and 1 rice cultivar buried in the soil. Seeds were collected from 3 counties: Lonoke, Lincoln and Desha, in Arkansas. The burial experiment was carried out in Stuttgart and Kibler AR. Red rice seeds were buried in the soil, both in flooded and non flooded conditions, at 3 depths: 0, 3 and 6 inches. In Stuttgart permanent flood was established in the fall by constructing a bay surrounded by levees. In Kibler flooding was simulated using buckets filled with water and burying these in soil at different depths. At the excavation time, germinated and deteriorated seeds were removed and counted and the remaining seeds were incubated in Petri dishes at 30°C for 10 days. After this period, the non-germinated seeds were treated with tetrazolium to assess viability.

Results showed that the lowest germination occurred at the shallower depth and seeds buried deeper maintained highest viability. Total seed viability did not differ significantly between flooded and non flooded conditions. The non-germinated seeds from flooded condition had higher germination than the non-flooded seeds. This result suggests that in flooded situations, the dormancy of red rice seeds was broken but the seeds were not able to germinate until subjected to favorable conditions. A blackhull awned population (LIN 1) showed the greatest dormancy, while among the other populations no significant difference in viability was observed. In Kibler 2 populations, LON 5 and LON 6, showed the lowest viability in every condition. The cultivated rice displayed the lowest viability (60%) compared to red rice populations. In Kibler, no germination occurred in the field and germination in Petri dishes was also lower compared of Stuttgart for all the population. This first findings suggest a probable low degree of red rice seed longevity. According to previous studies, fall soil tillage need to be delayed until the next spring to permit the germination of red rice seeds in the early fall and in the spring, that facilitate the depletion of the soil seed bank. Moreover, red rice control can be more effective if soil tillage is shallow to avoid the weed seed burial deep in the soil.