



NATIONAL BIOLOGICAL SERVICE  
U.S. DEPARTMENT OF THE INTERIOR

# NBS INFORMATION BULLETIN

No. 59 1995

## SEED DETERIORATION IN FLOODED AGRICULTURAL FIELDS DURING WINTER

Agricultural fields and fields containing "weedy" vegetation (i.e., moist-soil management units) are flooded during winter in the Mississippi Alluvial Valley to provide valuable habitat for waterfowl. Landowners impound water behind a system of levees and natural contours by using strategically placed water control structures. Fields potentially flood from October through March, and seeds in these fields may be submerged for more than 120 days.

Because submerged seeds deteriorate, the length of time a field is flooded and the type and abundance of seeds present in the field influence the amount of food available to waterfowl throughout winter. To refine estimates of the value of agricultural fields as waterfowl foraging habitat, we estimated rates of seed deterioration in flooded fields and moist-soil management units in the Mississippi Alluvial Valley. We determined the rate of seed deterioration (change in dry mass expressed as a percentage) for three crops, corn (*Zea mays*), rice (*Oryza sativa*) and soybean (*Glycine max*), and eight weeds commonly found in agricultural fields and moist soil management units. The weeds were broadleaf signalgrass (*Brachiaria platyphylla*), junglerice barnyardgrass (*Echinochloa colonum*), morning-glory (*Ipomoea* sp.), panic grass (*Panicum* sp.), bull paspalum (*Paspalum boscianum*), red rice (*Oryza sativa*), hemp sesbania (*Sesbania exaltata*), and bristleglass (*Setaria* sp.).

### SEEDS SUBMERGED IN AGRICULTURAL FIELDS

Except for corn, which was obtained from a local grain elevator, seeds for our study were collected in fields at or near trial locations. After air drying, known quantities of seeds were placed in individual polyvinyl chloride cylinders (5 cm tall and 10 cm in diameter) and covered with <0.05 mm nylon mesh. During the winters of 1991-92,

1992-93 and 1993-94, cylinders containing seeds were placed in flooded rice and soybean fields and moist-soil management units within the Yazoo Basin of western Mississippi and the Grand Prairie region of eastern Arkansas. Rice and soybean samples were placed in their respective fields, but corn was placed in a moist-soil unit because flooded cornfields were not readily available in the study area. Weed seed samples were distributed among fields because they are present in all three field types. Depth of flooding varied from less than 10 cm to greater than 1 m. For each seed species, three or four cylinders were removed from the flooded fields at intervals of about 2 weeks. Recovered seed samples were washed through a 500 micron screen to remove silt and clay particles, dried under forced air, and reweighed. The percentage of weight loss was then calculated. The rate of change was estimated by regressing percentage of mass lost against number of days submerged.

### CROPS DETERIORATE FASTER THAN WEEDS

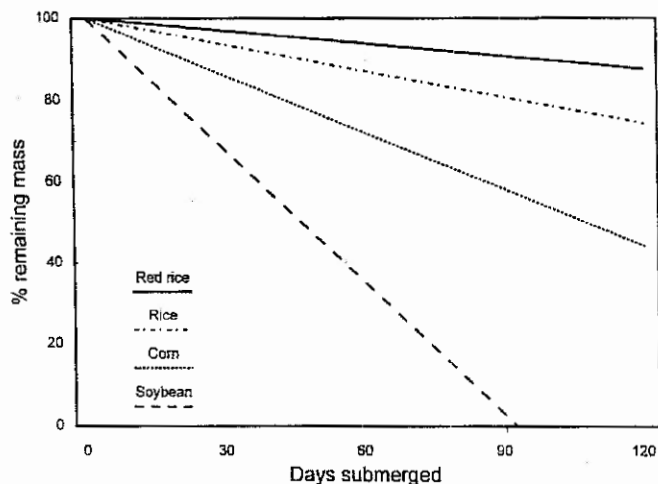
Crop seeds deteriorated faster than weed seeds (Figs. 1 and 2; note Y-axis scales). Soybeans deteriorated within 90 days. In contrast, more than 50% of the corn remained after flooding for 100 days, and 74% of rice persisted even after 120 days. Interestingly, red rice, which is the same species as cultivated rice but considered a nuisance weed by rice growers, deteriorated at about half the rate of cultivated varieties. Among the weeds, bull paspalum and morning-glory deteriorated at the slowest and fastest rates, respectively (Fig. 2). Weed seeds, with the exception of morning-glory, deteriorated slower than corn and soybean, whereas rice decomposed slower than all weed seeds except red rice and bull paspalum. Sesbania had a deterioration rate similar to bristleglass and junglerice barnyardgrass, but it is little used by waterfowl.

Information Bulletins are internal National Biological Service documents whose purpose is to provide information on research activities. Because Information Bulletins are not subject to peer review, they may not be cited. Use of trade names does not imply U.S. Government endorsement of commercial products.

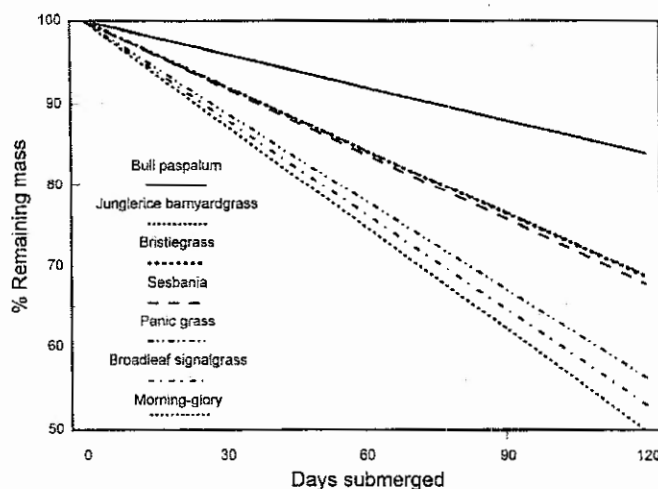
For land managers desiring to provide plant food for wintering waterfowl, rice is clearly the most persistent major crop in the Mississippi Alluvial Valley. Persistence of weed seeds, which are adapted to flooding throughout winter, makes them a cost-effective alternative to traditional crops on land managed for waterfowl. These weeds are common in many crop fields, and their benefit to waterfowl may give growers an incentive to trade off some crop production, through reduced cultivation and herbicide application, to provide food for overwintering waterfowl, while concurrently reducing their investment in the crop.

For further information contact

Curtis O. Nelms or Daniel J. Twedt  
Southern Science Center  
Mississippi Valley Research Field Station  
900 Clay Street  
Vicksburg, Mississippi 39180  
(601)634-8963



**Fig.1.** Percentage of seed mass remaining for crops and red rice after submersion in flooded agricultural fields in western Mississippi and eastern Arkansas during the winters of 1991-92, 1992-93, and 1993-94.



**Fig. 2.** Percentage of seed mass remaining for weeds after submersion in flooded agricultural fields in western Mississippi and eastern Arkansas during the winters of 1991-92, 1992-93, and 1993-94. Note that the vertical scale differs from Fig. 1.