

Water-Seeded Rice

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Water-seeding rice is a common production method in southern Louisiana and areas in Texas and California. In Arkansas, water seeding usually accounts for less than 5 percent of total rice acres. The primary reasons for water-seeding are for red rice suppression, reduced labor and reduced inputs. Water-seeding can also aid in timely planting and reduce the risk of herbicide drift in areas where crops such as cotton are grown in close proximity to rice. Precision-leveling fields to zero grade has received increased interest due to decreased labor, ease of management, potentially less input costs and the ability to produce continuous rice.

Conventional Water-Seeding

Field Preparation

The primary objectives in field preparation are to destroy winter vegetation and reduce the chance of seedling drift. Water-seeding presents many new problems to rice farmers that are not common in dry-seeding rice. The following information is a general outline of water-seeding procedures. Following these guidelines should reduce the potential of stand loss, resulting in the need for replanting. A rough seedbed is essential. Leaving the soil ridged minimizes seedling drift. If drift occurs, there can be areas in the field with little or no rice seedlings, and replanting may be necessary. On clay soils, this can generally be accomplished with a disk and/or field cultivator. The field should be left with large clods (baseball size or smaller) to allow seeds an area to settle without being subject to drift. On silt loam soils, the ridges created

by the field cultivator may dissolve due to water movement and leave the soil surface smooth. Therefore, this method is not recommended on silt loam soils. The recommended method of final seedbed preparation before flooding on both silt loam and clay soils is to use an implement called a groover. It is similar to a flat roller with angle iron rings on 6- to 8-inch centers. The groover forms small furrows in the seedbed, and the weight of the groover packs the soil, preventing the wave action of the water from smoothing the soil surface. Packing the soil also creates a level seedbed, which prevents high spots in the field where the soil may be exposed. Generally, high spots develop into areas that are heavily infested with weeds and/or red rice because of the lack of water coverage

Management Key

Begin with a rough seed bed through the use of a groover or through tillage and leave the surface cloddy on clay soils. The rough seedbed minimizes seedling drift.

The recommended seeding rate for water-seeded rice is 30 percent greater than for drill-seeded rice. Because in water-seeded rice the seed is on the soil surface, blackbird depredation tends to be more severe. Insects such as rice seed midge can also reduce rice stand density by feeding on the embryo as the seedling develops. Consult the RICESEED computer program for specific seeding rates for cultivars in water-seeded rice (Chapter 4, Rice Stand Establishment).

Methods of Presoaking

In water-seeding, the rice seed can be dry or pregerminated (presoaked). Pregerminated seed is highly recommended to enhance stand establishment and reduce risk of injury from rice seed midge. Pre-germinated seeds are generally soaked for 24 to 36 hours, drained 24 to 48 hours and then flown into the flooded field. The duration of the drain period is dependent upon the air and water temperature. Under cool conditions (50°-60°F), seedling development is slow and a longer drain period may be necessary; however, in warmer conditions (greater than 65°F), a drain period of 24 hours or less is usually sufficient.

In general, when rice is pregerminated, about 50 percent of the seeds have the coleoptile emerging from the seed coat. This stage of seedling development is sometimes called 'pipping.' Rice seeds treated with gibberellic acid (Release or GibbGro) should not be used in water-seeded rice. Gibberellic acid promotes rapid shoot development which increases the risk for seedling drift.

When the rice is seeded dry, seeds are more likely to drift. If rice is presoaked, the heavy, wet seeds immediately fall into the grooves in the seedbed. **If Bolero herbicide is used preplant, seeds must be presoaked.** One problem farmers have is determining the best soaking method when pregerminating seed. Some farmers have built small grain bins which hold the seed and the water. After soaking and draining, the seeds are then augured into a truck prior to being flown into the water. Super (bulk) bags are often used to soak rice seed. The super bags are placed into a soak tank or pit. After soaking and draining, a boom is necessary to load the seed into the plane. Various other methods are commonly used by growers to soak seeds. Consult county Extension agents or other growers for more information on pregerminating seed.

Management Key

Use presoaked seed to minimize injury from rice seed midge and increase the potential for stand establishment.

Water Management

An adequate water supply is necessary for water-seeded rice. Fields should be small to ensure precise water management. Poor water management results in loss of both preplant nitrogen and red rice suppression. The methods of water management used in water-seeding rice are pinpoint and continuous flood. The pinpoint flood is recommended, especially if Bolero is used preplant. In pinpoint flooding, the water is drained to allow seedlings to anchor (peg down) their roots in the soil. The soil should not be allowed to crust (dry). Using the pinpoint flood method, you should be able to flood the field within five days and drain and reflood within three to five days for maximum red rice suppression. Thus, small fields approximately 40 acres in size are desirable for optimum water management. During the drain period, the seedling is exposed to oxygen, which promotes root growth for seedling anchorage. The drain period generally ranges from one to five days, depending upon soil type and weather conditions. The field should be reflooded with a shallow flood and the flood increased as the rice seedlings develop. With the continuous flood method, the water is maintained at a constant level and is never drained. Seedlings may take longer to peg down and be more susceptible to drift with this method. This method is best used on precision-leveled fields where a uniform, shallow flood can be maintained.

Management Key

Small fields are more effectively managed than larger fields when water seeding because of more precise water management ability.

Nutrient Management

A large percentage of the nitrogen required may be preplant incorporated in conventional water-seeded rice. However, no-till water-seeded rice presents very different challenges. Specific rates and nitrogen management practices for water-seeded rice are outlined in the Chapter 9, Soil Fertility.

Weed Control

Water-seeding rice is a cultural system that can be used to effectively reduce red rice. Water-seeding suppresses red rice and other grasses because the soil's oxygen is replaced with water once the field is flooded. **A rule of thumb is that grass or rice will emerge (germinate) either through soil or water but not both.** For the best red rice control, flood fields immediately after land preparation. This limits the amount of red rice seed that might germinate prior to flooding. The water-seeded system alone provides up to 75 percent red rice suppression when done properly. If herbicides such as Bolero are integrated into the system, red rice suppression may approach 90 percent.

If Bolero 8E (4 lbs ai per acre) is utilized, it should be applied after the field has been grooved. Bolero has activity on red rice, barnyardgrass, sprangletop and some aquatic weeds. After the surface application of Bolero, flood the field in preparation for planting. Refer to the herbicide label and MP44, *Recommended Chemicals for Weed and Brush Control*, for product use information. Some rice cultivars are sensitive to Bolero in the water-seeded system; therefore, these cultivars are not recommended for water seeding.

Command can be used in water-seeded rice. Application timing is pegging. Command used in this system will control grasses that may germinate during pegging of water-seeded rice.

The flooded environment changes the weed species that may cause problems in water-seeded fields. Weeds such as ducksalad, redstem, gooseweed, eclipta, dayflower and arrowhead are aquatic weeds that may be more severe problems in water-seeded rice. The herbicide Londax has good activity on most of these aquatic weeds. Londax should be applied after seedling rice has pegged down and the flood is stabilized as aquatic weeds are small and emerging. Londax should be applied at rates of 1 to 1.67 ounces per acre (product) for aquatic weed control. The best control is obtained when Londax is used before aquatic weeds become established or are just emerging. Alternative control measures for

aquatic weeds include propanil, Regiment, Grasp, propanil tank mixed with Basagran, Strada or Grandstand after removing the flood or 2,4-D at mid-season. Be sure to read the herbicide label(s) since use guidelines for water-seeded rice may differ from those for dry-seeded rice.

Clearfield rice and the herbicides Newpath and Beyond can be effective tools for use in water-seeded rice. The main benefit of using Clearfield rice is red rice control. The main drawback to using Clearfield rice in water-seeded systems is that many of these systems are in continuous rice production. The safe plant-back interval of Newpath herbicide to regular rice cultivars is 18 months. Crop rotation to soybeans is recommended prior to planting conventional cultivars behind Newpath. Two applications of Newpath are required for season-long red rice control. In water-seeded rice there are fewer opportunities to make these applications. There is a statement on the Newpath label that says, "Do not apply in standing water"; this is due to a reduction in activity of Newpath. Therefore, opportunities to apply Newpath include burn-down, pre-flood and pegging. In addition, you can make a followup application of Beyond late POST-flood for controlling any escaped red rice.

In addition to red rice and other grass weeds, Newpath is the only in-crop herbicide that has been effective for suppression of rice cutgrass. Also, Beyond herbicide will effectively control ducksalad and suppress barnyardgrass later in the season.

Due to a heavy reliance on Permit, Newpath and other ALS-inhibiting herbicides over the past few years, a few populations of ALS-resistant annual sedges and yellow nutsedge have been identified. In addition, umbrella sedge is typically only found in zero-grade fields and cannot be effectively controlled with ALS herbicides. A good program approach for these sedge populations is to apply 3 quarts per acre of propanil and 3 pints per acre of Bolero early post-emergence (1-2 leaf) and then follow that later in the season with an application of propanil plus 1.5 pints per acre of Basagran. This program will typically provide 80 to 90 percent control of heavy sedge populations.

Insect Control

Rice water weevils can be a severe problem in water-seeded rice. The adult weevils are attracted to the open areas of water during early seedling development. Rice water weevil larvae cause damage to rice seedlings by pruning the root system. Root pruning occurs much earlier in water-seeded rice than in drill-seeded rice. Rice water weevils are attracted to the field earlier than in drill-seeded rice. Because the younger rice is flooded, more generations of rice water weevil larvae are likely, leading to longer time for feeding pressure compared to drill-seeded rice. In water-seeded rice, the larvae feed on less-developed roots of 2- to 3-leaf rice causing more severe injury early compared to tillering rice in drill-seeded culture. Preventative treatments are generally required to control rice water weevil in water-seeded rice. Treatment thresholds and treatment options are given in Chapter 12, Insect Management in Rice.

Management Key

Scout carefully for rice water weevil during the first 8 weeks after peg-down. Rice water weevil will be more severe in water-seeded rice than drill-seeded rice.

No-Till Water-Seeded Rice

While tillage does not influence many of the concerns for water-seeded rice, some specific circumstances should be considered when no-till water seeded rice is produced, particularly in continuous rice rotations.

Rice Stubble Management

One of the biggest challenges to producing continuous rice is managing the stubble from the previous crop.

Obviously, in no-till systems, cultural practices must be worked out to prevent the stubble from interfering with the current crop. When the stubble is left in the field, decaying residue from the previous crop can cause production of organic compounds that are toxic to seedling rice. This happens regardless of whether the field is flooded in the winter or not. Therefore, the residue should be destroyed by tillage or burning. Since tillage is not desired, burning becomes the means to destroy the stubble. When a stripper header is used for harvest, the stubble will probably need to be cut and spread with a flail mower or equivalent. However, a conventional header with a good straw spreader will also prepare the field for an effective burn without the need for mowing.

Management Key

Burn the rice stubble in the fall for continuous, no-till rice fields to reduce the negative impacts on the next rice crop.

Nitrogen Management

Nitrogen management is a critical part of no-till water-seeded rice. The system does not allow efficient use of N fertilizer. Applications into the floodwater result in loss by ammonia volatilization. Preplant applications onto dry soil prior to flooding and seeding are not effective because the N is not incorporated. Many have found that multiple applications spread about 10 to 14 days apart are the most efficient means. However, this technique will usually result in as much as 25 percent more N fertilizer required compared to what would be needed in a dry-seeded field.