

# FACT SHEET

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## WEED CONTROL IN RICE

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Weeds compete with rice for nutrients, water and light. If weeds are allowed to shade rice during the reproductive stage, a greater reduction in yield can be expected compared to early weed infestation. Weeds reduce rice yields and market quality and increase costs of harvesting, drying and cleaning.

Some of the weeds most commonly found in Texas rice fields are barnyardgrass, junglerice, broadleaf signalgrass, red rice, sprangletop, duckweed, gooseweed, redstem, dayflower, hemp sesbania, northern jointvetch and mexicanweed. Of these, the most abundant and difficult to control are barnyardgrass, sprangletop, red rice and dayflower.

The best approach to controlling weeds in rice involves a combination of good cultural, mechanical and chemical practices.

### CULTURAL METHODS

#### Weed-Free Seed

It is important that seed rice contain a minimum number of weed seed. Planting rice seed infested with weed seed is a major cause of new weeds being introduced into rice fields. Once weeds become established in a field they are difficult to eradicate. The use of weed-free seed should be of particular concern to farmers who produce seed rice. Farmers who use certified seed are insured a supply of seed that is relatively free of weed seed.

#### Crop Rotation

Proper crop rotation can play an important role in controlling weeds in rice. A suggested rotation in

Texas includes rice and soybeans. If weeds are controlled in both crops in the rotation, maximum benefits can be realized. Sprangletop, barnyardgrass and red rice can be controlled by the use of chemicals in soybeans. Many broadleaf weeds which are not easily controlled in soybeans can be controlled in rice with propanil or the phenoxy herbicides, or in pastures with the phenoxy herbicides. The combination of crop rotation and the proper use of herbicides is more effective in controlling weeds than either practice used alone.

#### Seedbed Preparation

There are several methods of preparing a seedbed including plowing, disking, harrowing or a combination of these methods. The appropriate method and time depends on factors such as soil, previous crop and field condition. Seedbed preparation is important in controlling weeds in rice. It is very important to eliminate all weeds prior to seeding rice.

Periodic and thorough cultivation in the fall and prior to planting will remove unwanted vegetation and stimulate weed seed germination. In the spring, delayed rice seeding along with cultivation immediately before planting will help control weeds. The last cultivation should be shallow so as not to bring weed seed near the surface of the soil. If all weeds are killed during cultivation prior to planting, new infestations of annual weeds must develop from previously ungerminated seeds. Removing all weeds from the field just before planting increases the efficiency of herbicides, since weeds germinating after the rice has been planted will emerge uniformly and will be easier to control than weeds of various sizes.

#### Land Leveling and Water Management

If rice land contains ridges and low areas, weeds such as barnyardgrass and hemp sesbania may be more numerous on the ridges and aquatic weeds a

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problem in the low areas. Land leveling and accurate levee construction is important in a rice weed control program as flooding to a uniform depth provides for better weed control. After herbicide applications fields should be flooded quickly and uniformly to minimize weed reinfestation. Also, timely and thorough draining of the rice field helps control aquatic weeds. After draining, care must be taken to prevent soils from drying to the extent that weed seed can germinate and emerge. The use of herbicides in combination with good water management can provide adequate control of most weeds.

Levees are ideal for weeds to grow and reinfest the field. If the number of levees can be decreased by land leveling, weed reinfestation is reduced.

## CHEMICAL METHODS

Herbicides can be used to effectively control many weeds in rice. It is important to use the correct rate of chemical, to properly calibrate equipment and to apply according to label directions to avoid crop injury and achieve good weed control. The following sections provide suggestions for the use of herbicides for weed control in rice.

### Propanil

Propanil, properly applied, controls many grasses and broadleaf weeds in rice. Propanil is a post-emergence herbicide and has no preemergence activity. Best results are obtained when it is applied to rapidly growing young weeds. Poor control can be expected if application is delayed until grasses are in the 5-leaf stage or later and broadleaf weeds are taller than 2 inches. Although rice is quite tolerant to propanil, temporary injury can occur if propanil is applied when the temperature is below 50 or above 95 degrees F, or if the rice is stressed. Damage is usually limited to yellowing and foliar burn which usually disappears in a short time. Weeds are best controlled when daily maximum temperatures range from 70 to 90 degrees F.

Best control of most weeds is obtained with two applications of propanil rather than a single application at a higher rate. The recommended rate of application is 3.0 pounds in 8 to 10 gallons of water per acre. Do not use more than 6 pounds of propanil per acre per application or 8 pounds per acre during a season. It is suggested that an initial application be made to control young weeds. After the first irrigation or rainfall but before permanent flood, a second stand of weeds may occur. The second application of propanil should be made approximately 1 week to 10 days after these weeds emerge. The permanent flood should be applied within 2 to 4 days after the last application to prevent weeds from reinfesting treated fields. To obtain maximum weed control with propanil, 12 hours should elapse between treatment and rain or flooding.

It is not necessary under normal conditions to add surfactants or nonphytotoxic oils to the spray mixture. However, under cool growing conditions the addition of a surfactant may increase weed control. The application of propanil in combination with nitrogen aqueous solutions is not recommended, because research has shown that there is greater chance of rice injury with no increase in weed control.

Rice may be severely injured if carbaryl (Sevin), parathion or malathion are applied within 14 to 21 days of spraying with propanil. After applying carbofuran (Furadan) or Bux, rice should not be treated with propanil.

### Molinate (Ordram)

Although molinate (Ordram) does not control most broadleaf weeds, it does control barnyardgrass and dayflower and suppresses annual sedges. In combination with propanil, molinate also controls sprangletop if applied when these weeds are less than 1 inch tall.

Molinate can injure rice if allowed to come in direct contact with the rice seed. Therefore, certain restrictions must be observed when applying the herbicide. For example, preplant incorporated application of molinate can be made only on water-seeded rice, since dry-seeded rice, either drilled or broadcast, would be in greater contact with the herbicide.

Molinate applied preplant must be incorporated into the soil to a depth of 2 inches within minutes of application. Although either the granular or emulsifiable concentrate can be used, the emulsifiable concentrate is the preferred formulation for soil incorporation. The field should be flooded for seeding and the water held for 4 to 6 days. The field can be drained, but it is desirable to maintain moist soil conditions to prevent weed seed germination.

Postemergence application of molinate prior to permanent flood can be made on dry- or water-seeded rice. It is suggested that a combination of 2 to 3 pounds molinate plus 3 pounds propanil per acre be applied for dayflower control, or 3 pounds molinate plus 3 pounds propanil per acre be applied for sprangletop control. Timing of application is particularly important for control of sprangletop. Research has shown that applications at the one- to two-leaf stage of sprangletop are most effective, so the farmer should observe his fields closely to ensure timely application. Rice should be flushed or flooded within 5 days after treatment.

Molinate can be metered into the irrigation water where the water enters the field at the time of permanent flood. This method can be used for control of barnyardgrass and dayflower under 5 inches tall on dry-seeded rice. For the molinate to be effective, the dayflower must remain completely submerged and barnyardgrass two-thirds submerged until control is achieved.



Since molinate must be metered into the water during the entire irrigation period and a metering device must be used to maintain constant rate, this technique does require careful equipment calibration and prior knowledge of flooding time. Therefore, uniform herbicide distribution and application of the recommended rate are often difficult to achieve by this method.

Granular and emulsifiable concentrate formulations can be applied postemergence after permanent flood. Weeds must be either completely or partially submerged depending on species and herbicide formulations used. Refer to the label to determine specific recommendations for the use of various formulations for the control of specific weeds.

### **Phenoxy Herbicides**

The phenoxy herbicides, such as 2,4-D, MCPA and silvex, applied postemergence will control many broadleaf weeds and certain sedges. Timing of application is particularly critical with this group of herbicides. Rice is most tolerant to these herbicides from late tillering to panicle initiation. The length of time required for rice to reach the late tillering stage varies with variety and weather conditions. Very early maturing varieties may reach the late tillering stage 5

to 6 weeks after emergence, while mid-season varieties reach late tillering 7 to 9 weeks after emergence. The length of time that the rice plant is tolerant to phenoxy herbicides is only 7 to 10 days. Therefore, close observation must be made to ensure minimum damage to rice. Rice injury may occur if the phenoxyes are applied before late tillering or after panicle initiation.

Phenoxy herbicides are applied at 0.5 to 1.25 pounds per acre. Care must be taken to prevent drift of phenoxy herbicides to susceptible crops such as soybeans and cotton. The sodium, potassium and lithium salts are the safest to use since they are non-volatile compared with the amine salts and esters. Esters are least desirable to use since the danger of drift exists even after application. Vapors of ester may move to sensitive crops especially when temperatures exceed 95 degrees F. The Texas Department of Agriculture enforces regulations associated with the use of phenoxy herbicides under the Texas Herbicide Law. Information regarding these regulations can be found in the "Texas Herbicide Regulation" handbook. Check with your county Extension agent regarding specific restrictions.

Table 1 lists some suggested herbicides that can be applied as needed.

TABLE 1. Suggested Herbicides, Presented Chronologically, for Weed Control in Rice

Time of application	Herbicide and rate (pounds a.i./acre)	Weeds controlled	Weed growth stage
Preplant incorporated, water-seeded rice only	Molinate (Ordram) - 3.0 lbs.	Barnyardgrass	
<b>Postemergence</b>			
<b>A. Early</b>	Propanil - 3.0 lbs.	Barnyardgrass, broadleaf-signalgrass, hemp sesbania, northern jointvetch, fimbriatilis, mexicanweed, crabgrass, croton, fall panicum, pigweed, spikerushes	Grasses — 1- to 3-leaf; Broadleaf — less than 2 inches.
	Propanil 3.0 lbs. followed in 2 weeks with Propanil - 3.0 lbs.	Same as above	Same as above at both applications.
	Propanil - 4.0 to 6.0 lbs.	Same as above	Grasses — 4 to 6-leaf; Broadleaf — greater than 2 inches.
	Propanil - 3.0 lbs. + Molinate-2.0 to 3.0 lbs.	Same as above plus dayflower and sprangletop	Grasses — 1- to 3-leaf; Broadleaf — less than 2 inches; Sprangletop — 1- to 2-leaf; Dayflower — less than 1 inch.
<b>B. At permanent flooding, metered into irrigation water</b>	Molinate - 3.0 lbs.	Barnyardgrass	Under 5 inches (2/3 submerged)
		Dayflower	Under 5 inches (fully submerged)
<b>C. After permanent flood, directly into flood water</b>	Molinate (granule or emulsifiable concentrate)- 3.0 lbs.	Barnyardgrass	2 to 5 inches (2/3 submerged)
<b>D. Late tillering to panicle initiation</b>	2,4-D - 0.50 to 1.25 lbs. MCPA - 0.50 to 1.25 lbs. Silvex - 0.50 to 1.25 lbs.	Certain broadleaves such as hemp sesbania, northern jointvetch, morningglory, gooseweed and dayflower	Before reproductive stage.

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