Chapter

3

# Rice Cultivars and Seed Production

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Public rice cultivars developed by land-grant institutions such as the University of Arkansas are currently planted on most U.S. rice acreage. This is, in part, due to the relatively small U.S. rice acreage. In contrast, private companies provide the majority of cultivars (varieties) for row crop commodities such as corn, soybeans and wheat. Recent technological advances in production of transgenic crop cultivars, hybrid rice development and specialty markets have stimulated private industry interest in rice breeding and cultivar development (Figure 3-1). Privately-owned cultivars represented approximately 64 percent of the Arkansas rice acreage in 2017, of which 42 percent were hybrids and 45 percent were Clearfield cultivars.Land-grant universities are cooperating with private industry to develop improved cultivars that will assist rice farmers in controlling pests and will add other valuable traits to rice that will help producers and consumers alike. University rice breeding programs remain committed to producing conventional public rice cultivars.

Since 1936, 45 varieties have been developed and released in Arkansas. Between 1936 and 1982, the rice breeding program in Arkansas was carried out by United States Department of Agriculture scientists working at the Rice Research and Extension Center near Stuttgart. The rice check-off program began providing partial financial support for the University of Arkansas rice breeding and development program in 1980, and a rice breeder was hired the same year. Since 1982, 29 varieties have been developed and released by the University of Arkansas rice breeding program. From 1984 to 2009, University of Arkansas-developed varieties were grown on 42 to 86 percent of

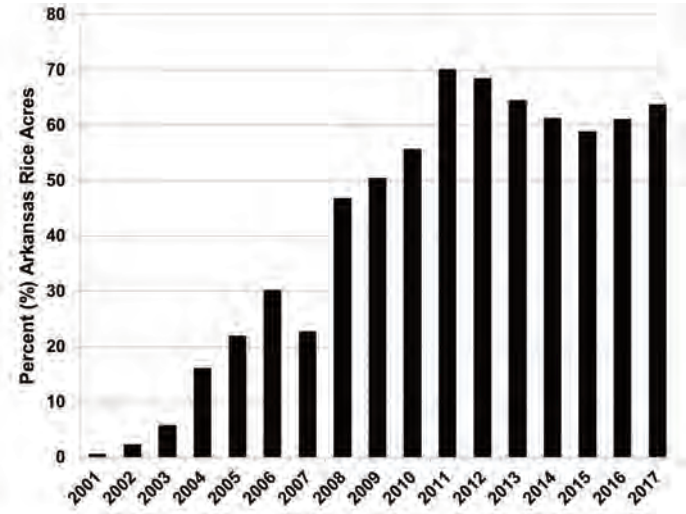


**Figure 3-1. Adoption of cultivars marketed by private companies since 2001.**

**Table 3-1. Description of four seed rice certification classes.**

| Seed Class | Tag Color | Description |
|---|---|---|
| Breeder | White | Breeder seed is not available to the public and is reserved for licensed plant breeders for the production of foundation, registered or certified seed. |
| Foundation | White | Progeny of breeder seed. Is also reserved for licensed plant breeders. Must be produced under the direct supervision of licensed plant breeder to maintain genetic purity/identity of the variety. |
| Registered | Purple | Progeny of foundation seed. |
| Certified | Blue | Progeny of either registered or foundation seed. |

the Arkansas rice acreage, depending on the year. Since 2009 the privately owned cultivars have increased dramatically.

## Rice Seed Production

Certified rice seed can be divided into four distinct categories (Table 3-1). When a new cultivar is released, the cultivar and its complete description are registered with the National Committee on Registration of Crop Varieties. Foundation seed must be maintained according to these registered standards. The general field inspection and cleaned seed standards for rice seed certification by class are provided in Tables 3-2 and 3-3.

**Table 3-2. Arkansas State Plant Board field inspection standards for seed rice certification†.**

| | Seed Class | | |
|---|---|---|---|
| Factor | Foundation | Registered | Certified |
| Other cultivars | None | 1 / 5 sq rods | 1 sq rod |
| Noxious weeds | None | None | None |
| Red rice | None | None | 1 plant/acre |

†Standards as of 2006. Standards taken from the certified seed directory.

**Table 3-3. Arkansas State Plant Board cleaned seed inspection standards for seed rice certification†.**

| | Seed Class | | |
|---|---|---|---|
| Factor | Foundation | Registered | Certified |
| Pure seed (minimum) | 98.0% | 98.0% | 98.0% |
| Other varieties‡ | None | None | 2 / lb |
| GMO varieties†† | <0.01% | <0.01% | <0.01% |
| Other crop seed (maximum) | None | None | 2 / lb |
| All noxious weeds | None | None | None‡‡ |
| Total weed seed (maximum) | 0.03% | 0.03% | 0.08% |
| Inert (maximum) | 2.0% | 2.0% | 2.0% |
| Germination (minimum) | 80.0% | 80.0% | 80.0% |
| Moisture (maximum) | 14.0% | 14.0% | 14.0% |

† Standards as of 1999. Standards taken from the certified seed directory.
‡ Other varieties shall not include variations which are characteristics of the varieties.
†† Includes genetically modified varieties, such as Liberty Link rice. Based on regulations passed December 28, 2006.
‡‡ Four pounds of cleaned rice seed is hulled from each lot to determine the noxious weed content, including red rice.

Land where seed rice is grown must not have been planted to a different rice cultivar or uncertified seed of the same cultivar for two previous years. The State Plant Board (#1 Natural Resources Drive, Little Rock, Ark. 72205) is the agency responsible for regulating the seed industry in Arkansas. The State Plant Board sets and enforces seed certification standards and maintains a seed testing laboratory. Descriptions of each cultivar for which certified rice seed is produced in Arkansas are available. Additional information concerning certified seed production standards/regulations and laboratory services can be obtained from the Arkansas State Plant Board in Little Rock, Ark. (501-225-1598). Use of certified seed rice is highly recommended to ensure high quality seed and to aid growers in controlling the spread of noxious weeds.

The certification classes described pertain to "pure-line" varieties. Hybrid rice is developed quite differently. The seed for hybrid rice are the first generation of seed produced after a cross (F1 population). The seed produced from the cross has extremely high vigor, resulting in high yield potential. However, if the second generation of seed is planted, the plants segregate and a wide variety of plant types will result and only a small percentage of those plants will resemble the F1.

### Management Key

Plant certified seed to reduce the spread of noxious weeds such as red rice, hemp sesbania, and northern jointvetch. Also, a guaranteed emergence percentage increases the chances of good stand establishment.

Because of the nature of hybrid seed, seed must be obtained by repeating the cross each year. Seed should not be saved from hybrid seed fields. Even in fields where rice follows hybrid rice, volunteer rice from the previous crop will often have a wide range of variability that results from segregation in the F2 generation. Although the production of hybrid seed does not follow the same pattern as conventional varieties (i.e., breeder, foundation, registered, etc.), the seed must conform to standards for germination, noxious weeds, red rice, etc. Hybrid rice must also state the percentage of the seed that is true hybrid (i.e. > 70%), which also reflects the maximum amount of the seed that "self-pollinated." This self-pollinated seed should resemble the female parent. Since only female rows are

harvested, these self-pollinated plants will resemble the female parent.

## Genetically Modified Rice

Genetically modified rice is rice that has been "engineered" to exhibit a specific trait, such as herbicide resistance, added nutrients, disease resistance or insect resistance, by inserting a gene from another organism that will cause the plant to express that trait. This is the same process that was used to produce glyphosate resistance in soybeans, corn, cotton and other crops. Other transgenic traits include Bt corn and cotton, and numerous other traits in other crops.

While most of the row crops currently produced in Arkansas are genetically modified, rice and wheat are not, due to significant market resistance. These products have been approved by the USFDA and pose no health risks from the consumption of these products. However, consumer resistance in rice and wheat has stifled the adoption of this technology, and to this date no GMO rice is commercially grown in Arkansas.

Clearfield rice represents a successful technological development without utilizing genetic engineering to accomplish herbicide resistance. Clearfield rice does not have genes inserted from other organisms and subsequently is not genetically modified. Clearfield technology has been a successful advancement for rice farmers across the Mid-South and has had rapid adoption by producers.

## Rice Cultivar Performance and Agronomic Characteristics

Many agronomic factors must be considered when choosing rice cultivars for production (Table 3-4). The general strengths and weaknesses of available cultivars are summarized in Table 3-5. Environmental factors affect grain and milling yield each year. Because the environment is different each year, several years of testing and observation are needed to make valid comparisons among cultivars. Therefore, data from the 2015-2017 Arkansas Rice Performance Trials have been summarized to better evaluate cultivar performance.

Several recently released cultivars have data for only one or two years. For more up-to-date information on cultivar performance and characteristics on different soil textures, consult the most recent edition of the Cooperative Extension Service's publication *Arkansas Rice Performance Trials*, available at your local county Extension office or it may be downloaded at http://arkansas-variety-testing.uark.edu.

**Management Key**

Select cultivars for specific fields and the conditions and history associated with that field.

Cultivar yield performance data in Table 3-4 should be used with disease ratings included in Chapter 11, Management of Rice Diseases, and nitrogen recommendations in Chapter 9, Soil Fertility, to assist in making cultivar selection. A general description of the major varieties and hybrids is provided in Table 3-5. A brief description of special-purpose varieties is presented in Table 3-6. Cultivars differ in grain and milling yield potential, maturity, straw strength, disease resistance and cooking and processing characteristics. Therefore, consider all of the following factors when selecting a cultivar.

- Field history of disease and cultivar ratings: blast, sheath blight, smuts, stem rot.
- Field history of weed species and herbicide program.
- Soil texture and seedling vigor.
- Seeding method.
- Susceptibility to lodging.
- Maturity group and seeding dates.
- Grain and milling yield performance.
- Irrigation capacity.
- Geographic location.

Additional factors that must be considered before final selection are:

- Market demand for different grain types or cultivars.
- Availability of good quality, red rice-free seed.
- Planting dates and estimated harvest schedules.

**Table 3-4.** Results of the Arkansas Rice Performance Trials averaged across the three-year period of 2015-2017.

| Cultivar | Grain Length[1] | Straw Strength[2] | 50% Heading[3] | Plant Height | Test Weight | Milled Kernel Weight[4] | Chalky Kernels[4] | Milling Yield | | | | Grain Yield by Year | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 2015 | 2016 | 2017 | Mean | 2015 | 2016 | 2017 | Mean |
| | | rating | days | inches | lb/bu | mg | % | % Head Rice - % Total Rice | | | | Bushels / Acre | | | |
| CL111 | L | 1.3 | 81 | 39 | 41.9 | 21.3 | 2.78 | 62-70 | 58-67 | 58-70 | **59-69** | 144 | 149 | 167 | **153** |
| CL151 | L | 2.1 | 81 | 38 | 41.3 | 19.9 | 3.57 | 61-70 | 53-70 | 58-70 | **57-70** | 166 | 164 | 191 | **174** |
| CL153 | L | 1.0 | 84 | 38 | 41.7 | 20.1 | 1.90 | 62-69 | 57-69 | 61-71 | **60-70** | 154 | 169 | 185 | **169** |
| CL163 | L | 1.5 | 86 | 38 | 41.3 | 20.7 | 2.32 | 61-70 | 54-70 | 60-70 | **58-70** | 151 | 150 | 190 | **164** |
| CL172 | L | 1.0 | 84 | 36 | 41.1 | 21.1 | 1.93 | 58-69 | 50-69 | 60-70 | **56-70** | 142 | 161 | 180 | **161** |
| CL272 | M | 1.0 | 84 | 38 | 41.7 | 21.9 | 2.23 | 62-70 | 53-69 | 52-68 | **56-69** | 162 | 176 | 193 | **177** |
| Diamond | L | 1.4 | 84 | 40 | 41.3 | 21.4 | 1.61 | 60-69 | 55-68 | 56-69 | **57-69** | 186 | 188 | 206 | **194** |
| Jupiter | M | 1.8 | 85 | 36 | 40.3 | 20.9 | 2.35 | 61-68 | 57-69 | 59-67 | **59-68** | 176 | 167 | 203 | **182** |
| LaKast | L | 1.5 | 81 | 41 | 42.0 | 21.7 | 1.53 | 56-68 | 55-69 | 56-70 | **56-69** | 162 | 182 | 188 | **177** |
| MM14 | M | 1.1 | 83 | 33 | 42.8 | 21.1 | 1.46 | 61-69 | -- | 55-68 | **58-68** | 155 | -- | 186 | **171** |
| Roy J | L | 1.0 | 88 | 41 | 40.8 | 20.7 | 1.70 | 61-70 | 55-69 | 60-70 | **58-70** | 169 | 167 | 196 | **177** |
| RT 7311 CL | L | 2.0 | 83 | 42 | 38.9 | 20.5 | 5.38 | -- | 54-69 | 50-69 | **52-69** | -- | 208 | 214 | **211** |
| RT CLXL745 | L | 2.7 | 79 | 43 | 41.7 | 22.4 | 3.27 | 58-69 | 46-69 | 52-70 | **52-69** | 187 | 192 | 202 | **194** |
| RT Gemini 214 CL | L | 2.1 | 88 | 45 | 39.1 | 20.1 | 4.74 | -- | 53-69 | 56-69 | **54-69** | -- | 211 | 215 | **213** |
| RT XP753 | L | 1.4 | 80 | 43 | 42.2 | 21.2 | 3.12 | 54-69 | 45-67 | 49-70 | **49-68** | 212 | 231 | 220 | **221** |
| RT XP760 | L | 2.5 | 85 | 45 | 41.5 | 20.8 | 4.03 | 59-69 | 52-68 | 55-69 | **55-69** | 207 | 205 | 218 | **210** |
| Taggart | L | 1.1 | 87 | 43 | 41.2 | 22.7 | 1.54 | 58-70 | 47-69 | 59-71 | **55-70** | 167 | 179 | 183 | **176** |
| Thad | L | 1.0 | 87 | 37 | 41.5 | 20.6 | 1.05 | 58-69 | 52-70 | 57-70 | **56-69** | 137 | 147 | 185 | **156** |
| Titan | M | 1.6 | 80 | 38 | 41.3 | 22.5 | 1.95 | 56-68 | 54-69 | 51-68 | **53-68** | 165 | 192 | 200 | **186** |
| Wells | L | 1.1 | 85 | 40 | 41.4 | 21.9 | 1.75 | 57-70 | 52-69 | 55-70 | **55-70** | 161 | 171 | 182 | **171** |
| **Mean** | | **1.5** | **84** | **40** | **41.3** | **21.2** | **2.51** | **59-69** | **53-69** | **56-69** | **56-69** | **167** | **179** | **195** | **182** |

[1] Grain Length: L=long grain; M=medium grain.

[2] Relative straw strength based on field tests using the scale: 1=very strong straw, 5=very weak straw; based on percent lodging (2014, 2016 and 2017 data – no lodging in 2015).

[3] Number of days from plant emergence until 50% of the panicles are visibly emerging from the boot.

[4] Data from Riceland Grain Quality Lab, 2014-2016.

**Table 3-5. Brief description of general rice cultivar characteristics.**

| Cultivar | Grain Type | Year Released and Source | Highlights |
|---|---|---|---|
| Antonio | L | 2012 – Texas | A short season, semi-dwarf long-grain variety with very good yield potential and milling quality. Similar to Cocodrie for agronomic characteristics. |
| Bengal | M | 1992 – Louisiana | A short season, semi-dwarf medium-grain variety with good yield potential and milling quality. It has a preferred large grain size. |
| Caffey | M | 2011 – Louisiana | A short season, semi-dwarf medium-grain variety with excellent yield potential and milling quality. Susceptible to blast, sheath blight and panicle blight. |
| Cheniere | L | 2003 – Louisiana | A short season, semi-dwarf long-grain variety with good yield potential and milling quality comparable to Cypress. Susceptible to sheath blight and blast. |
| CL111 | L | 2008 – BASF, Horizon Ag | An early season, semi-dwarf long-grain Clearfield variety similar to CL 131. Susceptible to blast, straighthead, and bacterial panicle blight. |
| CL151 | L | 2007 – BASF, Horizon Ag | A mid-season, semi-dwarf long-grain Clearfield variety similar to Cocodrie with good yield potential and high tolerance to Newpath herbicide. It is very susceptible to blast and straighthead, and susceptible to lodging and sheath blight. |
| CL153 | L | 2016 – BASF, Horizon Ag | A mid-season, semi-dwarf long-grain Clearfield variety similar to CL151 with good yield potential and high tolerance to Newpath herbicide. Susceptible to sheath blight, kernel smut, and false smut. Moderately susceptible to blast. |
| CL163 | L | 2015 – BASF, Horizon Ag | A mid-season, semi-dwarf long-grain Clearfield variety with good yield potential and milling quality and high tolerance to Newpath herbicide. Susceptible to sheath blight and blast. Moderately susceptible to bacterial panicle blight. High amylose content. |
| CL172 | L | 2016 – BASF, Horizon Ag | A mid-season, semi-dwarf long-grain Clearfield variety with good yield potential and milling quality. High tolerance to Newpath herbicide. Moderately susceptible to sheath blight, blast, bacterial panicle blight, and kernel smut. Susceptible to false smut. |
| CL272 | M | 2016 – BASF, Horizon Ag | A mid-season, medium-grain Clearfield variety. High tolerance to Newpath herbicide. Very susceptible to bacterial panicle blight. Susceptible to sheath blight and blast. |
| Della-2 | L-A | 2012 – Louisiana | A short season, semi-dwarf long-grain aromatic variety with good yield and very good grain quality. Improved lodging compared to Della. |
| Diamond | L | 2016 – Arkansas | A mid-season, long-grain variety with excellent yield potential and good milling quality. Very good straw strength. Susceptible to blast and sheath blight, moderately susceptible to bacterial panicle blight. Very susceptible to false smut. |
| Francis | L | 2002 – Arkansas | A short season, long-grain variety with excellent yield potential, susceptible to rice blast and very susceptible to kernel smut. It is the best long grain for high pH and salt soils of NE Arkansas west of Crowley's ridge but should not be stressed for water due to blast concerns. |
| Jazzman-2 | L-A | 2011 – Louisiana | A mid-season, Jasmine-type aromatic variety with fair yield and good milling compared to Jazzman. Susceptible to sheath blight, bacterial panicle blight, and straighthead. |
| Jupiter | M | 2006 – Louisiana | A mid-season, semi-dwarf, medium-grain variety with excellent yield potential and milling quality. It has a small grain size but has moderate resistance to bacterial panicle blight. |

*(Continued on page 26)*

**Table 3-5. Brief description of general rice cultivar characteristics. (cont.)**

| Cultivar | Grain Type | Year Released and Source | Highlights |
|---|---|---|---|
| LaKast | L | 2014 – Arkansas | A mid-season, long-grain variety with excellent yield potential and good milling quality. Susceptible to blast and sheath blight. |
| Mermentau | L | 2012 – Louisiana | A mid-season, semi-dwarf, long-grain variety with good yield potential and physical characteristics similar to Cocodrie, Cheniere, and Catahoula. |
| MM14 | M | 2014 – Missouri | A mid-season, medium-grain variety with good yield potential. Susceptible to bacterial panicle blight. |
| Rex | L | 2010 – Mississippi | A short season, semi-dwarf long-grain variety with excellent yield potential and good milling quality. Very good straw strength, but is susceptible to most diseases. |
| Roy J | L | 2010 – Arkansas | A mid-season, long-grain variety with excellent yield potential and good milling quality. Excellent straw strength. Susceptible to blast and moderately susceptible to sheath blight. |
| RT 7311 CL | L | 2016 – RiceTec, Inc. | A short season, long-grain hybrid with excellent yield potential. Moderately susceptible to sheath blight. |
| RT CLXL729 | L | 2007 – RiceTec, Inc. | A short season, long-grain Clearfield hybrid with excellent yield potential and moderately susceptible to sheath blight and moderately resistant to blast. |
| RT CLXL745 | L | 2008 – RiceTec, Inc. | A short season, long-grain Clearfield hybrid with excellent yield potential, moderately susceptible to sheath blight, and moderately resistant to blast, and susceptible to lodging. Reported to have improved tolerance to shattering. |
| RT CLXP756 | L | 2011 – RiceTec, Inc. | A mid-season, long-grain Clearfield hybrid with good yield potential and average milling quality. Similar to CL XL729. |
| RT CLXL4534 | L | 2013 – RiceTec, Inc. | A short season, long-grain Clearfield hybrid with good yield potential. |
| RT Gemini 214 CL | L | 2016 – RiceTec, Inc. | A mid-season, long-grain Clearfield hybrid with excellent yield potential. Susceptible to sheath blight. |
| RT XL723 | L | 2005 – RiceTec, Inc. | A short season, long-grain hybrid with excellent yield potential, average milling quality; resistant to blast and moderately susceptible to sheath blight. |
| RT XL753 | L | 2011 – RiceTec, Inc. | A short season, long-grain hybrid with excellent yield potential. Resistant to blast, moderately susceptible to sheath blight and straighthead. |
| RT XL760 | L | 2014 – RiceTec, Inc. | A short season, long-grain hybrid with good yield potential. |
| Taggart | L | 2009 – Arkansas | A mid-season, long-grain variety with very good yield potential and average milling quality. Resistant to straighthead. Moderately susceptible to sheath blight and rice blast. |
| Thad | L | 2016 – Mississippi | A mid-season, long-grain variety with good yield potential and milling quality. Susceptible to blast, sheath blight, and straighthead, very susceptible to false smut. High amylose content. |
| Titan | M | 2016 – Arkansas | A short season, medium-grain variety with excellent yield potential. Moderately susceptible to blast and bacterial panicle blight. It has a preferred large grain size. |
| Wells | L | 1999 – Arkansas | A short season, long-grain variety with excellent yield potential, average to good milling quality, large kernel size similar to Lemont, but is susceptible to rice blast. Only moderately susceptible to kernel smut and most other diseases. |

**Table 3-6. Brief description of specialty cultivars.**

| Variety/Hybrid | Year Released and State | Highlights |
|---|---|---|
| AB647 | 1996 – Anheuser Busch | Selection from Congui, a Chinese indica rice, that is a long-season medium-grain with high yield potential and atypical cooking qualities. Used for brewing. |
| Baldo | Italy | A very short-season, large-kerneled medium-grain used for risotto. |
| Bolivar | 2001 – Texas | A very short-season long-grain with the same parboiling and canning properties as Dixiebelle. |
| Della | 1971 – Louisiana | Aromatic, mid-season long-grain with low yield potential and average milling quality that is susceptible to lodging. |
| Dellmati | 1999 – Louisiana | A semi-dwarf, aromatic long-grain which elongates when cooked. |
| Dellmont | 1992 – Texas | Semi-dwarf, aromatic long-grain with good yield potential and milling quality. |
| Dellrose | 1995 – Louisiana | A semi-dwarf, aromatic long-grain with high yield potential and good milling quality. It has grain size similar to Della. |
| Dixiebelle | 1996 – Texas | Short-season long-grain with 'Newrex' quality; specialty rice used for canning and steam tables. |
| Hidalgo | 2005 – Texas | A semi-dwarf long-grain with good yield potential and milling quality. Cooking type similar to Toro. It is susceptible to blast and moderately susceptible to sheath blight. |
| Jasmine-85 | 1990 – Texas | Aromatic long-grain with good yield potential and poor milling quality. |
| Jazzman | 2008 – Louisiana | Aromatic long-grain with good yield potential and milling quality. |
| Jazzman-2 | 2010 – Louisiana | A semi-dwarf, fragrant long-grain with good yield potential, good milling quality and very strong aroma. Jazzman-2 is susceptible to rice sheath blight, bacterial panicle blight and straighthead but moderately resistant to blast. |
| JES | 2009 – Arkansas/Florida | Aromatic long-grain with good yield potential and milling quality. |
| Koshihikari | Japan | A premium-quality short-grain with low yield potential and good milling quality. It is the standard for Japanese quality. |
| Neches | 2005 – Texas | A long-grain waxy rice with good yield potential (similar to Lemont) used for flour and starch in processing industry. Moderately resistant to blast and very susceptible to sheath blight. |
| Pirogue | 2002 – Louisiana | A short-season short-grain with good yield potential and good milling quality. |
| Sabine | 2006 – Texas | Short-season long-grain with 'Dixiebelle' quality. Similar agronomic traits as Dixiebelle, with higher yield potential. Specialty rice used for canning and steam tables. |
| Sierra | 2005 – Texas | An aromatic long-grain with the fragrance and cooking qualities of a basmati-style rice. |
| Toro 2 | 1984 – Louisiana | Special-purpose, low amylase and low gelatinization temperature, long-grain rice. Toro 2 cooks moist and sticky like a medium-grain rice. |

Seeding a large percentage of acreage in a single cultivar is not recommended. Planting several cultivars minimizes the risk of damage from adverse weather and disease epidemics and allows for a timely harvest which increases the chances of obtaining good quality seed with maximum milling yields. Since environmental conditions can greatly affect yield, it is also recommended to spread seeding dates so that cultivars do not reach critical growth stages at the same time. Consult the DD50 computer program to plan harvest schedules based on emergence dates of cultivars.

## Management Key

Plant multiple cultivars across the farm acreage to reduce risk from diseases and adverse weather.

## Other Cultivars

Cultivar characteristics and yield performance data presented in this section are for the rice cultivars grown on the majority of rice acreage in Arkansas. Information on other "specialty cultivars" or "older cultivars not commonly produced" may be available from the University of Arkansas Cooperative Extension Service and Agricultural Experiment Station upon request.

## Kernel Classification and Cooking Qualities

Rice cultivars are classified as either long-, medium-, or short-grain by their rough, brown and milled kernel dimension ratios (Table 3-7). Since kernel type, dimension and cooking quality are of primary importance to millers and processors, these characteristics are considered in cultivar development.

**Table 3-7. Grain type classification based on kernel dimensions.**

| Grain Type | Grain Form | Kernel Length/Width Ratio |
|---|---|---|
| Long | Rough | ≥ 3.4 to 1 |
| Long | Brown | ≥ 3.1 to 1 |
| Long | Milled | ≥ 3.0 to 1 |
| Medium | Rough | ≥ 2.3 to 1 |
| Medium | Brown | ≥ 2.1 to 1 |
| Medium | Milled | ≥ 2.0 to 1 |
| Short | Rough | ≥ 2.2 to 1 |
| Short | Brown | ≥ 2.0 to 1 |
| Short | Milled | ≥ 1.9 to 1 |

The cooking qualities of rice depend on the chemical composition of the rice grain. The rice kernel is made of starch. Starch consists mainly of highly branched chains called amylopectin and some linear chains with fewer branches called amylose. The temperature at which the rice starch forms a gel when cooking is the gelatinization temperature. The amylose content and gelatinization temperature influence the cooking quality of the rice grain.

Most long-grain cultivars grown in the southern U.S. have cooking qualities described as typical. Cultivars with "typical southern U.S. cooking quality" produce rice that is dry and fluffy (nonsticky) when cooked. These cultivars are parboiled, quick-cooked or used in processed rice products. Aromatic long-grain cultivars, such as Della, Dellmont and Jasmine 85, tend to have similar textures when cooked but also have a distinct taste and aroma when cooking. Cultivars such as Toro-2 are sticky rices due to low amylose contents and should not be commingled with other long-grain cultivars because of their nontypical physiochemical characteristics.

Medium-grain cultivars produced in the southern U.S. produce moist, sticky rice when cooked, in contrast to the dry, fluffy, long-grain types and are preferred for dry breakfast cereals, soups, baby foods and brewing purposes. Toro-2 is a low amylose long-grain variety that cooks sticky like medium-grain cultivars.

Traditional southern U.S. long-grain rices, such as Cypress, Wells, Roy J and Diamond, have intermediate amylose contents of 20 to 24 percent and intermediate gelatinization temperatures of 70° to 75°C (158 to 167 °F). In comparison, extra high amylose rices, such as Rexmont and Dixiebelle, have an amylose content greater than 24 percent and intermediate gelatinization temperatures. The medium- and short-grain rices, such as Bengal, Nortai, Pirogue and Koshihikari, have low amylose content (10 to 20 percent) and gelatinization temperatures less than 70°C (158°F).

Traditional southern U.S. long-, medium- and short-grain cultivars are translucent or clear in appearance. Waxy or glutinous rices have an amylose content of only 1 to 2 percent, a low gelatinization temperature (< 70°C; <158°F) and an opaque appearance. They are often used in sweets, frozen products and as thickening agents. In general, if the amylose content is intermediate to high, the rice cooks drier and less sticky. Low amylose rice tends to cook stickier, and waxy rices are very sticky. The starch-iodine-blue test is used to estimate amylose content during early stages of cultivar development.