

Rice Protocol

History

Oryza sativa, or Asian rice, is an annual monocot in the Poaceae family, and is comprised of two main types, *indica* (long grain) and *japonica* (short grain). *Indica* is made up of two groups, *indica* and *aus*, while the *japonica* varieties consist of *temperate japonica*, *tropical japonica* and *aromatic japonica*. Rice is one of the most important staple food crops in the world. Three billion people, or half the world population, are dependent upon rice for a significant portion of their daily caloric intake, while the cultivation of rice is the primary means of support for a billion people worldwide. About 700 million tons of rice is produced each year, with Asia producing nearly 90% of the world's rice supply. China is both the largest producer and consumer of rice in the world.

It is important to know the type of rice to be grown in our greenhouses, so that irrigation methods can be modified for optimum plant growth. We typically use Taipei 309 (*japonica* type).

Planting/germination

1. Line the bottom of a 4"X4"X3" pot with a square of agrofabric or paper towel measuring 3 ¼" X 3 ¼", or enough to cover the holes.
2. Place the needed number of pots in the appropriate tray. Pots can be spaced 15 per tray.
3. Fill pots with Turface MVP. This is a coarse calcined-clay. Water each pot until completely moist.
4. Plant 2-3 rice seeds per pot, depending upon the germination rate of the seed and the intended purpose for the plants. Seeds should be planted just below the surface, fully covered by the Turface. (Thinning out seedlings post-germination is recommended to reduce fungal pest pressure, and improve overall plant health.)
5. Place the tray on the mist bench in 10A. The bottom heat is set at 82°F.
6. Fertilize daily with 15-16-17, 200 ppm N once the seed has germinated.

Growing to seed

1. Once plants are 3-4 weeks from planting date, they should be moved from the mist bench in 10A to the flood bench in 5B. An iron drench may be applied at this time at a rate of 1 tsp/gallon if the plants are yellowing.
2. All benches in 5B are set up for automatic irrigation. The water comes on for 3.5-4 minutes, turns off, then drains out of the flood trays over the course of 6-8 minutes. Total time the pots are submerged in water is 9.5-12 minutes. The irrigation comes on every 3 hours from 7am until 4pm: Twice with tempered and twice with 15-16-17 fertilizer . (Ex. 7am tempered, 10am fertilizer, 1pm tempered, 4pm fertilizer)
3. *If you are watering rice by hand in a small flood tray, plants are fertilized daily with 15-16-17, 200 ppm N. First, unplug and drain the flood tray, then re-plug and fill flood tray with fertilizer. Let the rice sit in the fertilizer water for 1-1.5 hours before draining. Once the fertilizer water has drained out, the flood tray should be re-plugged and filled with RO or tempered water.
4. An iron drench may be applied 1x every 2-4 weeks as needed until panicle maturation.
5. Once the seed heads are brown, watering can be stopped. Plants may be moved to a regular bench, irrigation capped to prevent the flood tray from filling, or flats can be moved into G9B to hasten dry down at this time.
6. Panicles may be harvested once they are completely dry (no green).

***Note: Obligate short-day varieties will likely not flower if grown with a 14 hour day length. Knowing the light requirements of your rice before planting is advised.**

***Growing Nipponbare Japonica Variety**

To date, Nipponbare has failed to naturally initiate its reproductive phase in G5B's conditions alone, primarily due to G5B's 14 hour day length. A vernalization treatment in a chamber of 10 hour short days at 28C for 2-4 weeks has shown to be successful to force flowering. It is recommended that the transfer into a chamber with these conditions occurs no later than 4 weeks into the plant's development.

Pests

Greenhouse grown rice does not usually require treatment for pests or diseases. Occasionally they may need treatment for grain aphids or spider mites. We know of no pesticide phytotoxicity issues in rice.

Fungal Pests

- Preventative measures are taken to control the outbreak of various fungal pathogens including Rice Sheath Rot (*Fusarium Proliferatum* and *Sarocladium oryzae*). Once the trays of rice are transferred from G10A to G5B, a granular fungicide, Clearys 3336 (thiophanate-methyl), can be applied to each pot at a rate of 1/2tsp per pot. Over time, this granular breaks down, and enters the plants systemically, having a prolonged preventative effect. Over the course of the plants' life cycle, an additional treatment of Heritage (Azoxystrobin) is applied to the foliage by spray. Utilizing an additional mode of action with this product aids in the control of sheath rot appearing and/or proliferating.
- Pest scouting for potential outbreaks is performed daily. In the event of a small outbreak, a "spot-spray" of Heritage is administered to the affected area, along with a second application of Clearys 3336 to the infected plants, and those in the immediate proximity of said infection if original application of Clearys has all dissolved.
- Dead plant material is also cleaned out during the tillering phase to reduce any potential pest pressure, and promote better air flow.
- Humidity is also kept low to prevent an outbreak. After crops are harvested and removed, flood trays are washed and sanitized before they can be used again.
- It is recommended to allow plants to dry down in 5B if the plants were infected with sheath rot over the course of their life cycle. This is to prevent the spreading of spores into other greenhouses, and to keep the pathogen quarantined to G5B.

Recommended Growth Conditions:

Temp: 28°C day/ 25°C night (82.4°F/77°F)

Humidity: 30-70%

Light: The Supplemental lights turn on when the sunlight is below 400 W/m² and to maintain a 14 hour day length. The HID lighting is an evenly-distributed mix of High Pressure Sodium (to encourage the reproductive phase) and Metal Halide (to promote healthy vegetative growth).

Shading: The shade curtain automatically closes to 50% when the sunlight level is over 900 W/m² and it pulls to 100% when the sunlight is over 1000 W/m².