Duration is 115 d and the height 115-130 cm. Panicles are droopy, compact, straw yellow in color, 20 cm long, and have five spikelets/cm. Yield is 8.0-10.0 t/ha and 1.000-grain weight is 34 g. Hulling recovery is 79%, milling recovery 74%, and head recovery 64-73%. Its pericarp is white and its endosperm is translucent. Grain length is 7 mm with 1.8:1 length-to-breadth ratio. Protein content in polished rice is 8-9%. ■

# CROP AND RESOURCE MANAGEMENT

## Fertilizer management—organic

### *Sesbania rostrata* mutant with long vegetative phase

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*S. rostrata* Brem. produces N-fixing nodules on the main stem, branches. and roots. It reportedly can produce as much as 250 kg N/ha in 52 d. It is sensitive to short photoperiod and grows poorly, nodules sparsely, flowers early, and produces insufficient phytomass. We tried to improve this plant by developing a fast-growing, day-neutral type through the induced mutation approach.

An $M_2$ generation (gamma ray treated) of *S. rostrata* was planted in Dec 1989. The control and most of the plants flowered 30-40 d after planting (DP). One plant, however, flowered at 10 mo in Oct 1990. Seeds of this late-flowering mutant (LFM) and the parent were sown in 1-m-long rows at a 30-d interval from Dec 1990 to Sep 1991.

In a different experiment, three sets of 15 plants/pot were exposed to an 8-h photoperiod for 10 d at 15, 45, and 60 DP. A set of 15 plants and a LFM kept in the field served as control. We recorded flowering time and height at parent flowering.

The LFM flowered later than the parent in all 10 of the staggered sowings (see figure). Flowering time of the parent differed depending on sowing time. But LFM flowered only during mid-Oct to Nov, regardless of sowing time. The shortest vegetative phase of the parent was 35 d (Dec sowing); for LFM, it was 70 d (Sep sowing). LFM sown during Dec-Feb flowered with the next cycle of short days.

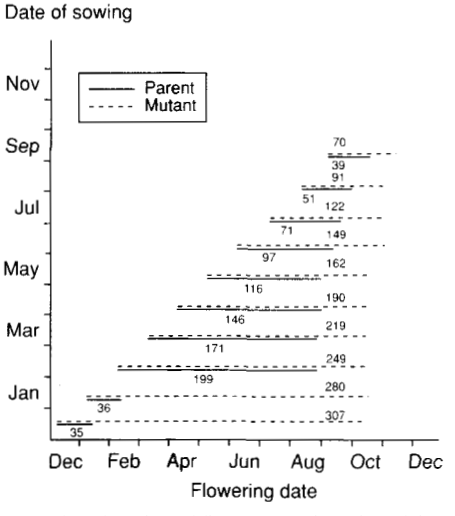
Short-day exposure for 10 d at three growth stages induced early flowering in the parent (see table), while LFM was insensitive to short days up to 60 d after sowing (DAS). LFM exposed to short days flowered from 222 to 227 DAS as did the controls. Both experiments show that LFM is insensitive to the critical short photoperiod up to at least 60 DAS. Plant height indicated that the growth of the LFM was similar to that of the parent, or better.

The LFM can be grown to obtain sufficient phytomass year-round because it is insensitive to the inductive photoperiod for a longer period than its parent. ■

**Days to flowering and plant height after exposure of *S. rostrata* and LFM to short photoperiod.**

| Age at exposure (DAS) | Days to flowering (no.) | | Plant height (cm) | |
|---|---|---|---|---|
| | Parent[a] | Mutant | Parent | Mutant |
| 15 | 37 (12) | 222 | 116 ± 2 | 102 ± 2 |
| 45 | 64 (9) | 227 | 156 ± 3 | 171 ± 5 |
| 60 | 86 (15) | 226 | 170 ± 4 | 190 ± 11 |
| Control | 151 | 217 | 353 ± 18 | 368 ± 21 |

[a]Figures in parentheses are the no. of days from completion of short-day exposure to flowering.




Date of sowing, date of flowertng, and number of days to flowering (figures on and below the lines) of *S. rostrata* parent and mutant.

## Integrated pest management—diseases

### Detection of *Xanthomonas oryzae* pv. *oryzae* (Xoo) with the monoclonal antibody-based biotin-avidin enzyme-linked immunosorbent assay (ABC-MAb-ELISA)

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We have generated 15 hybridoma cell lines that stably secrete monoclona1 antibodies (MAbs) by fusing mouse myeloma cells (SP2/0-Ag14) and spleen cells derived from BALB/c mice immunized with a preparation of Xoo strains Ks-6-6, Os-213, Yz-32, and Yz-34. The MAbs were used to detect Xoo using the double antibodies sandwich enzyme-linked immunosorbent assay (DAS-ELISA) technique. The sensitivity of ELISA was improved by adding the biotin-avidin system. This technique, called ABC-MAb-ELISA, was compared with DAS-ELISA, DAS-ABC-ELISA, indirect ELISA (ID-ELISA), and ID-ABC-ELISA, which use the MAbs as either the primary or secondary antibody. ■