Major benefits to agriculture from studies of photoperiodism have been achieved in the United States. Selection of adapted varieties, planting at optimum dates, and the storage of plant materials for suitable periods at proper temperatures are but a few examples of practices related to photoperiodism.

Beachell (2), Adair (1) and Jenkins (3) have reported on the effects of various day-lengths and dates of sowing on the flowering behavior of some American varieties of rice. Most of the research on photoperiodic response of rice has been reported from Japan, India, and Ceylon. From the results obtained by Kar and Adhikari (5), Misra (6, 7, 8, 9, 10, 11) and Sen (12) it appears that photoperiodic response of rice largely is dependent upon the variety. Much more research is needed to understand fully the mechanisms of flowering in the rice plant.

Materials and Methods

This study was designed to determine the photoperiodic behavior of two early rice varieties, T.N. 32 (a selection from Baljati of Lucknow district) and T.A. 64 (a selection from Hanshara of Unao district) of Uttar Pradesh. When seedlings of these varieties were 10, 20, 30, 40, and 50 days old, respectively, they were subjected to a 10-hour (8 A.M. to 6 P.M.) photoperiod for 1 month. In another experiment, seedlings of the same age were given the same short photoperiod treatment but prolonged until ear emergence. Each treatment consisted of 20 seedling plants. A control (normal photoperiod) was included for comparison.

Four seedlings per pot were planted outdoors in five replications in a randomized design. The 10-hour photoperiod was attained by keeping the pots in daylight from 8 A.M. to 6 P.M. and then removing them to a well-ventilated dark room for the remainder of the 24-hour cycle. The initial sowing was made on April 4, 1950.

Data were recorded on heading date, number of tillers per plant, plant yield, and the important components of yield, including number of panicles per plant, panicle length, grains per panicle, spikelets per panicle, percent seed set and weight per 1,000 grains.

Experimental Results

The data from these studies are summarized in tables 1 and 2 and certain responses shown graphically in figures 1 and 2. Representative plants of the variety T.A. 64 are shown in figure 3.

Time of Heading

The number of days required from sowing to emergence of the main shoot under different photoperiod treatments is summarized in table 1 and shown in figures 1 and 3. In all cases, short photoperiods delayed heading of the panicle. The delay in panicle emergence was directly related to the duration of treatment. For example, at 10-day age subjected to short photoperiod, heading were delayed 13 days in comparison to the controls, while those given a 1-month treatment were delayed 9 days in heading. Seedlings more advanced in age placed under short day were retarded successively less in heading. This relationship between age of seedlings to treatment and delay in heading was essentially the same for both varieties.

Tillering

The number of tillers per plant was determined at intervals during the ontogeny of the plant. When short-day treatments were given until heading, the number of tillers was increased when started with older seedlings. Short-day treatments for 1-month duration or longer produced consistent results as with the longer duration of photoperiod. General trends were the same. In all cases, 10-hour photoperiod reduced tiller development of seedlings exposed 10 or more days or less in age. This apparent inhibitory effect of short day on tiller development with young seedlings...