

Optimal Stage of Harvesting Rice

Timing of the harvest is very important for achieving maximum yield and quality of rice; too early a harvest reduces the yield due to the presence of more of ill-filled grains and too late a harvest results in field losses. Tropical rice varieties are usually harvested 30 to 35 days after flowering; but in cooler climates rices may ripen for up to 60 days (Juliano, 1972) as the environmental conditions affect the rate of starch and protein deposition in the developing grains. (Ebata and Nagata 1967). With the aim of critically, assessing the correct physiological maturity stage of different rice varieties in Cauvery delta, trials with Adt 31, Adt 34, IR 20, IR 34, Adt 36, Asd 15 and Ponni in *kuruvai* and Co 25 and Co 40 varieties in *thaladi* in 1979 and 1980 in the fields of the Paddy Experiment Station, Aduthuri following the recommended cultural practices were taken up. Though different harvest indices have from time to time been propounded (Pillaiyar, 1979) the stage of the crop after general flowering (G. F.) has been taken into consideration in this study. Individual panicles were labelled on the respective dates of flowering, unopened spikelets removed and the grain samples (developed and developing grain) collected at 5 days interval up to 20th day of flowering and subsequently on every day up to 30th day of flowering for determining 100-grain weight (dry basis) and moisture content. The moisture content was determined by drying the samples in hot air oven at $105 \pm 1^\circ\text{C}$ for 24 hr.

After five days of pollination, the grain moisture in *kuruvai* crop ranged from 68.8 to 63.0% and in *thaladi* crop from 65.7 to 57.3% and by 20th day, the grain moisture content in *Kuruvai* crop was 25.7% and in *thaladi* 25.1%. By 22-24th day the *kuruvai* crop attained the maximum dry weight of grain (fig. 1); but the *thaladi* crop attained full maturity only by 25-28 days of G. F. and the grain moisture content at this stage was 18%. Even by allowing the *kuruvai* crop in field for 6 more days beyond the physiological maturity stage for natural or field dryage, the moisture content did not reduce below 19.5%. Leaving the crop in field for the sole purpose of natural desiccation would result in significant field losses and impairing the milling quality. (Bhol *et al.*, 1970; Govindasamy and Ghosh, 1969; Sethuraman *et al.*, 1981). On the other hand, the presence of high field moisture at the full maturity stage of crop as in *kuruvai* could undoubtedly affect its thrashability (Sethuraman *et al.*, 1980; Nagarajan *et al.*, 1981) and such a crop can advantageously be thrashed after field desiccation by spraying pre-harvest desiccants (Pillaiyar *et al.*, 1977; Ramanujam *et al.*, 1979). Because of the high humid conditions till late February, leaving the crop for natural desiccation was not helpful; but substantial grain moisture reduction occurred in crop harvested later.

From the day of flowering, the dry matter accumulated in the grain

progressively and reached a maximum by 22 to 24 days after G. F. in *kuruvai* crop and there after the dry matter accumulation in the grain was more or less constant (Fig. 1). In *thaladi* season, the grain development was complete by 25 to 28-days after G. F. Govindasamy and Ghosh (1969) observed that the mid and late duration crops attained maximum growth by 33 to 39 days and early varieties by 25 to 33 days after G. F. The temperature, relative humidity and wind velocity during the period after 20 days of flowering seemed to play an important role in hastening the physiological maturity in rice. The prevalence of a high temperature (30.8 to 32.9°C), low humidity (69 to 75%) and high wind velocity (8.2 to 15.9 km/hr) during the grain development in *kuruvai* season seemed to have enhanced the grain maturity rapidly. On the other hand the prevalence of a low temperature, high humidity and low wind velocity during *thaladi* season prolonged the physiological maturity of this crop up to 28 days after G. F. The variations in the flowering time for *japonica*, *javanica* and *indica* cultivars were correlated with the day length, temperature and relative humidity (Misro and Prasada Rao, 1967). While growing *kuruvai* varieties in *thaladi*, the duration was prolonged (Table 1). The seasonal influence was felt on the vegetative phase also. Further, it was also observed that the *kuruvai* varieties flowered late in *thaladi* season (Table 1). Variations in the duration of Co 40 and Co 25 grown in the same season (*thaladi*) were also noticed (Table 2), even though the date of planting was more or less th

same in the successive years (15-8-75 and 27-8-76 in 1975-76 and 1976-77; 3-10-77 and 5-10-77 in 1977-78 and 1978-79) and this was mainly due to the fluctuating weather conditions in different *thaladi* seasons.

Considering the variations in the date of release of water from the reservoir on any day in June-Aug, the variations in the duration of different vegetative and reproductive phases are inevitable and as such, the correct stage of the physiological maturity of any variety grown under such conditions cannot be forecasted to decide either the date of harvest or spraying with pre-harvest chemical desiccants. As the harvest-index based on the moisture content has its own limitations, it is inevitable to decide the harvest-stage based on the physical condition of grains or from the proportion of milky grains in the panicle to get maximum field yield.

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Table 1. Seasonal influence on the date of General flowering and duration of rice in Cauvery delta (in days)

Variety	General flowering		Duration	
	Kuruvai (1979)	Thaladi (1979-80)	Kuruvai (1979)	Thaladi (1979-80)
Adt 31	80	86	105	119
Adt 34	81	91	106	117
IR 20	92	104	131	137
Ponni	97	108	129	133

Table 2. Yearwise variation in the date of general flowering of Co 40 and Co 25 varieties raised in *thaladi* season

Variety	1975-76	1976-77	1977-78	1978-79
Co 40	127	144	141	133
Co 25	137	135	125	122

Fig.1.GRAIN MOISTURE CONTENT AND 100 GRAIN WEIGHT AT DIFFERENT STAGES OF GRAIN DEVELOPMENT IN PADDY

0th DAY AFTER FLOWERING 10th DAY AFTER FLOWERING 20th DAY AFTER FLOWERING 30th DAY AFTER FLOWERING
5th DAY AFTER FLOWERING 15th DAY AFTER FLOWERING 25th DAY AFTER FLOWERING 35th DAY AFTER FLOWERING

