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Determining the suitable rice harvesting time in Edirne

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I – Introduction

Rice is generally planted in May and harvested between mid-September and the end of October in the north-west of Turkey. Harvesting is done by hand (with sickle and cutter bar). The cut crop is left to dry in the sun for a few days after which the sheaves are carried away to be threshed with combiners or threshers.

In Turkey, the rice growing season lasts for 150–160 days, from the 1st of May to mid-October. For a maximum yield and milling outturn, it is then essential to sow and harvest within that period. Early harvesting may reduce yield due to the presence of immature kernels. Late harvesting may also reduce yield on account of grain shattering and lodging.

The percentage of ripe grains in the panicles determines harvesting time. The crop is ready when 80% of the panicles are straw-coloured and the grains in the lower portions of the panicle are in the hard-dough stage. Farmers in some south and south-east Asian countries usually harvest at maturity to minimize field losses resulting from shattering and overripe, and unfavorable weather (De Datta, 1981). Nangju and De Delta (1970) reported that the optimum harvesting time for lowland rice was between 28 and 34 days after heading during the dry season and 34 and 38 days after heading during the wet season.

Govindaswami and Gosh (1968), from India, reported that harvesting between 27–39 days after flowering at high moisture content (18–23%) gave maximum head rice recovery. Harvesting before or after that period resulted in an increase of broken grains. In Japan, Eikichi (1954) found that the best time to harvest was 20–35 days after heading. In California, some growers reported high rice yields harvesting at 22–26% moisture. In Arkansas, rice is harvested at 18–22% moisture content (Huey, 1977).

Biswas and Choudbury (1984) reported that maximum yield and milling outturn, minimum breakage during milling, acceptable moisture content, green paddy in crop, chalky kernel in milled rice and paddy and milled rice appearance were obtained at 32 days after flowering in Bangladesh.

Shulten (1985) pointed out that the optimum harvesting time was 30–35 days after flowering; at this time 80% of the grains turn into a yellow colour.

The objective of this study was to determine the suitable rice harvesting time to obtain high paddy yield and quality milled rice.

II – Material and methods

The Rocca variety was used in this study. This is an Italian variety maturing at 135–140 days in the north-west of Turkey.

Starting at 35 days after flowering with 7 days intervals, 4 harvesting dates were applied, namely: 35, 42, 49 and 56 days after flowering (DAF). Three planting times were practiced: May 10, May 20 and May 30.

The experiment was conducted in factorial randomized block design with four replications at the Thrace Agricultural Research Institute in 1988, 1989 and 1990. Seed rate was 450 grains m² and fertilizer dose was N₁₅₀P₈₀ kg/ha; plot size was: 4 x 5 = 20 m² at planting.

Observations were done for the following traits.

- yield (ton/ha)
- 1 000 grain weight (g)
- unfilled and partially filled grains (%)
- moisture content (%) at harvesting
- milling outturn (%)
- breakage (%)
- chalky kernel (%)

III – Results and discussion

The highest yields were obtained at 49 DAF with early planting times (May 10 and May 20). However, there was no great difference among harvesting times in late planting. They almost gave the same amount of yields.

Biswas and Choudhury (1984) obtained the highest yield at 32 DAF in Bangladesh. On the other hand, Nangju and De Datta reported that the optimum harvesting time for lowland rice was between 28 and 34 days after heading during dry season and 34 and 38 days after heading during the wet season in tropical areas.

Depending upon planting times, the amount of unfilled and partially filled grains decreased from 23–16% at 35 DAF to 19.9–10.2% at 56 DAF (*Table 1*). 1000 grain weight increased up to 49 DAF and the grain filling was completed by this time, after which there was a slight decrease in grain weight.

During grain maturity, moisture content decreased continuously from 30–35% at 35 DAF to 19.9–24% at 56 DAF. At 42 and 49 DAF there were 27% and 25% moisture contents respectively. The 24–25% moisture content may be considered as an optimum for harvest. Similar results were obtained by Biswas and Choudhury (1984) in Bangladesh. Huey (1977) pointed out that high head rice yields were obtained by harvesting at 22–26% moisture in California, and at 18–22 % moisture in Arkansas.

The milling outturn increased from 70.6–71.5% at 35 DAF to 72–72.8% at 49 DAF. The percentage of chalky kernels in milling rice decreased gradually from 9% at 35 DAF to 3.3–5.8% at 56 DAF. Chalky kernels make the appearance of milled rice poor. The highest milling outturn and lowest breakage percentage was observed at 49 DAF in three planting times. Similarly, Govindaswami and Ghosh (1968) reported that harvesting between 27 and 39 days after flowering at high moisture content (18–23%) gave maximum head recovery in India and harvesting before or after that period resulted in an increase of broken grains.

The analyzed data on yield showed that there was no interaction between planting and harvesting times. Therefore, it is possible to pool all data obtained from three planting times. Pooled data showed similar results as explained above (*Table 2*).

IV – Conclusion

The study showed that maximum yield and milling outturn, minimum breakage during milling and unfilled and partially filled grains, acceptable moisture content, chalky kernel in milled rice were obtained at 49 DAF (*Table 2*).

As the early harvesting of paddy causes both quantitative and qualitative losses, harvesting should be done on time. Therefore, according to the results of the present study, the suitable time is 49 DAF in the north-west of Turkey. It may be one week earlier in the case of late planting.

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Table 1. The average of the results obtained in 1988, 1989 and 1990

Traits	Planting times											
	May 10				May 20				May 30			
	Days after flowering (DAF)				Days after flowering (DAF)				Days after flowering (DAF)			
	35	42	49	56	35	42	49	56	35	42	49	56
Yield (tons/ha)	648.6	672.7	760.3	688.4	494.9	530.5	574.4	500.0	595.0	570.0	567.0	575.0
Unfilled & partially filled grains (%)	22.6	19.7	18.2	16.7	23.9	18.4	18.8	19.9	16.1	16.5	9.6	10.2
Moisture content (%) (at harvesting)	31.7	27.8	24.3	19.7	29.9	27.6	25.1	24.3	34.0	26.8	25.4	24.5
Milling outturn (%)	71.5	72.1	72.4	71.8	70.5	72.0	72.0	71.6	70.6	72.2	72.8	72.6
Breakage (%)	8.5	8.4	5.9	9.9	8.6	9.2	8.5	12.0	7.5	8.3	8.3	10.8
Chalky kernel (%)	8.8	5.9	4.1	3.8	10.5	6.4	5.9	5.8	9.8	4.8	3.1	3.3
1000 grain weight (gr)	30.9	32.1	32.3	32.1	30.4	30.9	31.8	30.4	29.3	30.8	31.4	31.2

Table 2. The averages of data obtained from three planting times in 1988, 1989 and 1990

Traits	Days after flowering (DAF)			
	35	42	49	56
Yield (tons/ha)	579.5	591.1	633.9	587.8
Unfilled and partially filled grains	20.1	18.5	15.5	15.6
Moisture content (%) (at harvesting)	31.9	27.4	24.9	22.8
Milling outturn (%)	70.9	72.1	72.4	72.0
Breakage (%)	8.2	8.6	7.5	10.9
Chalky kernel (%)	9.7	5.7	4.4	4.3
1000 grain weight (gr)	30.2	31.2	31.8	31.2