

**GRAIN SHATTERING IN RICE AS INFLUENCED BY  
AGRO-CLIMATOLOGICAL FACTORS**

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Shedding or shattering of grain from the panicles at the time of harvest is one of the factors contributing to loss of yield in rice (Ramiah, 1953). It assumes great importance in areas where rice is extensively cultivated which ultimately results in extending harvesting season over long periods. Climatic conditions during a season are also reported to be responsible for grain shattering. A rice crop subjected to alternate heat in day and dew in night is reported to exhibit more shattering (Ramiah and Rao 1953). So far no information is available on the extent of shattering taking place when rice is grown in different periods of the year. Information on the influence of other agronomical practices on grain shattering is also lacking. Therefore these investigations are undertaken.

**Materials and Methods**

A shattering devise fabricated at Central Rice Research Institute (Jacobi *et. al* 1974) was used for the measurement of grain shattering in rice. Samples from two experiments conducted at Central Rice Research Institute during 1973 were used for this study. The treatments of the first experiment consisted of two varieties ie. Ratina and Vijaya and five levies of nitrogen ie. 0, 30, 80, 120, and 160 kg/ha, carried out in two seasons of *rabi* and *kharif*. The other experiment was having plots shaded with plastic frames to receive 40 to 45% of sunlight at different phases of plant growth such as vegetative, reproductive and ripening. This experiment also had two water management practices of continuous flooding and intermittent irrigation and this study was conducted for 3 periods of the year in January, June and August respectively.

30 panicles were collected at random from each plot for conducting this study (Vidyadharan and Ponnaiya 1964) panicles were carefully harvested so as to avoid field shattering to the extent possible. However, the grains shattered were counted before testing the panicles for shattering as per the method suggested (Jacobi *et. al* 1974). After the panicles were tested for shattering the number of grains shed including field shedding were counted. The intact grains in the panicles were also counted and the percentage grains shattered calculated.

## Results and Discussion

It is seen from the Table 1 that in *kharif* season grain shattering is less by 8 to 10 per cent than that of *rabi*. Varieties are found to be significantly different in this respect and indicate that shattering is governed by genetic factors to a great extent. Ratina has given a higher shattering per cent than Vijaya in both the seasons. This may be associated with the superior grain quality of Ratina than that of Vijaya. Srinivasan and Balasubramonian (1959) also recorded that fine grained varieties displayed shattering to a greater extent than coarse grained once.

Table 1  
Grain shattering (%) as influenced by seasons and N levels

Varieties	Rabi						Kharif						
	N levels kg/ha						N levels kg/ha						
	0	40	80	120	160	Mean	0	40	80	120	160	Mean	
Ratina	23.5	24.1	24.8	25.8	26.3	24.9	14.6	15.1	16.0	16.9	17.4	16.0	
Vijaya	19.5	19.9	20.4	21.5	22.1	20.7	8.5	9.0	9.6	10.5	11.3	9.8	
Mean	21.5	22.0	22.6	23.6	24.2	22.8	11.6	12.1	12.8	13.7	14.3	12.9	
CD	V means	0.2**						0.3**					
	N means	0.3**						0.3**					
	V X N n. s.							0.3**					

= Significant at 1% level

It is also seen that as the level of nitrogen is increased from 0 to 160 kg/ha the shattering per cent also is proportionately enhanced in both *rabi* and *kharif* seasons. The interaction effects are not significant in *rabi* but it is significant in *kharif*.

The shattering per cent of the 2nd experiment is presented in Table 2 a, b and c. Between different sowings June sowing has recorded the minimum and August sowing the maximum shattering per cent. This may be due to the reason that during the ripening period in August sowing the crop is exposed to a fairly high amount of solar energy during day while during night it is subjected to a low minimum temperature under the Cuttack conditions. This wide variation in weather has probably resulted in a higher shattering per cent. In *kharif* season (June sowing) this climatic variation is least and the shattering is also least. Ramiah and Rao (1953) also reported that a crop subjected to alternate heat during days and dew during nights exhibited a greater amount of shattering.

**Table 2**  
**Grain shattering as influenced by shading at different phases and water management practices.**

Water management	Shading treatments			Rip. phase	Mean
	No. shading	Veg. phase	Rep. phase		
(a)	<i>January sowing</i>				
Intermittent irrigation	21.6	19.6	18.6	17.8	19.4
Continuous flooding	22.5	20.1	19.0	18.4	20.0
Mean	22.1	19.9	18.9	18.1	19.7
CD at 1 % for shading means			0.3		
Water management means			0.5		
W X S <sub>n.s.</sub>					
(b)	<i>June sowing</i>				
Intermittent irrigation	11.6	9.2	8.5	7.8	9.3
Continuous flooding	11.6	9.6	9.0	8.2	9.6
Mean	11.6	9.4	8.8	8.0	9.5
CD at 1 % shading means			0.4		
Water management means			0.7		
S X W <sub>n.s.</sub>					
(c)	<i>August sowing</i>				
Intermittent	28.1	25.8	24.6	22.2	25.2
Continuous flooding	29.2	27.2	25.5	22.3	26.1
Mean	28.7	26.5	25.1	22.3	25.7
CD at 1 % shading means			0.6		
Water management means			0.9		
W X S <sub>n.s.</sub>					

With regard to the effect of shading, it is seen that the plants subjected to shaded conditions in all phases recorded a reduced shattering per cent. Shading at ripening phase has given lesser shattering than shading the earlier phases. Similar result of shading is obtained in all the 3 sowings. As to the effect of water management it is seen that continuous flooding exhibits more shattering than intermittent irrigation in all the seasons.

Summary

The grain shattering studies conducted at the Central Rice Research Institute cuttack with the improved devise showed that *rabi* season crop exhibits 8 to 10% more shattering than *kharif*(wet) season crop. Between varieties, Ratina is prone to shattering to a higher extent than Vijaya. Increasing the level of nitrogen also progressively increases the extent of shattering. Continuous flooding exhibits more shattering than intermittent irrigation. Shading at ripening phase has been found to exhibit lesser grain shattering than shading during earlier phases. This study thus indicates the necessity for evolving suitable high yielding varieties which can withstand the seasonal variation in respect of grain shattering.

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സംഗ്രഹം

കുതിരിൽ നിന്നും നെന്മണികൾ പൊഴിയുന്ന സ്വഭാവത്തെക്കുറിച്ച് മെച്ചപ്പെട്ട ഉപകരണമുപയോഗിച്ച് കട്ടക്കിലുള്ള കേന്ദ്രനെല്ലുഗവേഷണ കേന്ദ്രത്തിൽ ഒരു പാനം നടത്തുകയുണ്ടായി. റാബിവിളയിൽ ഖരിഫ് വിളയെക്കാൾ 8 മുതൽ 10 ശതമാനം വരെ കൂടുതൽ നെന്മണി പൊഴിച്ചിൽ അനുഭവപ്പെട്ടു. അതുപോലെ *raisxnm* വിജയ എന്നയിനത്തെ അപേക്ഷിച്ച് രത്ത എന്നയിനത്തിലായിരുന്ന കൂടുതൽ നെന്മണി പൊഴിച്ചിൽ കണ്ടതു്. നൈട്രജന്റെ തോതു് കൂടുന്നതനുസരിച്ച് ഈ സ്വഭാവത്തിലും വർദ്ധനവു് ഉണ്ടായി. തുടർച്ചയായി വെള്ളം നിർത്തുന്നതു് ഇടവിട്ടു് ജലസേചനം നടത്തുന്നതിനേക്കാൾ കൂടുതൽ നെന്മണി പൊഴിക്കുന്നതാണെന്നും, എന്നാൽ കുതിര പാകമാകുന്ന സമയത്തു് തണലു് കൊടുക്കുന്നതു് ഈ സ്വഭാവം കുറയ്ക്കുന്നതാണെന്നും വ്യക്തമാക്കുകയുണ്ടായി. ഇതിൽ നിന്നും, വിവിധ വിളകാലങ്ങളിലെ വ്യത്യസ്തത്തെ ചെറുത്തു നിലകുന്നതിനു് കഴിവുള്ളതും അധികോലപാദനശേഷിയുള്ളതുമായ ഇനങ്ങൾ വീകസിപ്പിച്ചെടുക്കേണ്ടതിന്റെ ആവശ്യകതയും വ്യക്തമാവുകയുണ്ടായി.

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