

## RICE CROP YELLOWING: DIAGNOSIS AND A MEANS OF AVOIDING

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Rice crop yellowing at different crop growth stages is a frequent field problem reported by extension staff and farmers from different parts of the island requesting possible remedial measures. Inadequate nutrient levels specially nitrogen (N), is one of the major causes for rice yellowing. Given below is an account to show the effects of inadequate N on rice yellowing and consequent poor growth.

During *yala* 96 at Rice Research and Development Institute, Batalagoda, several entries in a preliminary rice yield trial of 4 1/2 month age class showed varying levels of yellowing at 6 weeks after transplanting. Close observation of the experimental plots indicated that especially, the plants in the center showed yellowing symptoms in association with reduced tillering and poor plant growth. The plants in the boarder areas of the experimental plots showed better growth and distinct green colour

compared to plants in the center, providing a clue that inadequate nutrients may be the reason for yellowing and poor growth of the plants in the centre.

### EXPERIMENT

The yield trial with 10 varieties/lines was transplanted (T/P) in 3 X 6 m plots at 20 X 15 cm spacing with three plants per hill in randomized complete block design with 4 replicates on April 3rd 1996. Each experimental plot was surrounded by a 40 cm wide plants free space. The first top dressing of N was applied on 13th May 96 i.e., six weeks after T/P. By that time plants of many varieties/lines were showing poor growth in association with varying levels of yellowing. The degree of yellowing was recorded on three occasions viz., at 1st top dressing on May 13th 96, followed by weekly intervals on 20th and 27th of May 96. The results are presented in table 1.

Since it was a yield trial, destructive samples of larger size could not be used in this investigation. Therefore, two hills each from boarder (showing green and healthy growth) and plot centre (showing poor growth associated with yellowing) were uprooted from each variety/line and following data were recorded at six weeks after transplanting.

- a. No of tillers per hill
- b. Average shoot length (cm)
- c. Average root length (cm)
- d. Shoot dry weight (g)
- e. Root dry weight (g)

The results are presented Table 2

## RESULTS

Table - 1: Degree of rice crop yellowing\* at different dates during vegetative phase\*\*

Variety/line (T/P on 96.04.03)	6 weeks after T/P (96.05.13)	7 weeks after T/P (96.05.20)	8 weeks after T/P (96.05.27)
Bg 379 - 2	+	-	-
95 - 586	++	-	-
95 - 617	+	-	-
95-4014-2	+	-	-
95 - 4026	+	-	-
95 - 3679	+++	+	-
95 - 3727	+++	+	-
95 - 3724	++	+	-
95 - 394	+++	++	+
95 - 566	++	-	-

\*\* Plants were transplanted on 96.04.03

\* Degree of yellowing

- + less than 25% of leaves showing yellowing symptoms
- ++ 25 - 50% of leaves showing yellowing symptoms
- +++ 75% of leaves showing yellowing symptoms
- Show no yellowing symptoms

**Table 2: Comparison of few plant growth parameters between yellow (Y) and healthy (H) looking plants in several varieties of rice (yala 96) at 6 weeks after T/P before 1st top dressing**

Entry # / Variety line	Plant status	Tillers per hill	Average Root length (cm)	Average Shoot length (cm)	Average Root wt(g)	Average Shoot wt(g)
Bg 379-2	H	14	22.5	50	39.5	13.4
	Y	2	8.5	41	3.1	2.4
95 - 617	H	9	20.5	50	8.4	9.3
	Y	4	10.5	43	2.1	4.1
95 - 586	H	11	25.5	54	12.2	11.1
	Y	4	11.0	40	2.7	2.9
95 - 4014-2	H	9	25.0	53	11.3	10.1
	Y	2	11.5	43	1.7	1.8
95 - 4026	H	19	27.5	60	26.0	20.0
	Y	4	11.5	48	2.9	2.7
95 - 3679	H	16	31.5	54	12.4	14.4
	Y	4	10.0	48	2.6	4.7
95 - 3727	H	10	25.0	58	7.5	12.8
	Y	2	10.5	39	.5	1.4
95 - 3724	H	7	25.0	53	4	9.3
	Y	4	8.5	49	1.6	3.6
95 - 394	H	13	32.5	59	9.8	12
	Y	5	9.5	45	3.2	4
95 - 566	H	14	25	55	14.3	13.5
	Y	4	11	48	2.1	4.5
Average	H	12.2	26.0	54.6	14.5	12.6
	Y	3.5	10.25	44.4	2.25	3.2

## DISCUSSION

Based on the observations it is clear that varieties differ in their ability to tolerate and recover from N deficiency (Table1). The data in table 2 clearly indicate that delayed 1st

top dressing of N up to 6 weeks caused yellowing in association with reduced tillering and poor root and shoot growth. The adverse effects of inadequate N on tillering, root and shoot growth at this early growth stage can not

be entirely compensated during latter crop growth stages. Therefore, split application of N at 2, 6 and 10 weeks after T/P, as recommended at present for 4 1/2 months age class appears to be suitable for better plant growth.

Yellowing of rice crop could be due to deficiencies of nitrogen, sulfur, potassium, iron and magnesium or iron toxicity (yellow type). Symptoms of nitrogen deficiency are stunting, reduced tillering and general yellowing starting at lower leaves as N being a mobile element moves to actively growing young leaves. Sulfur deficiency also causes general yellowing symptoms starting at lower leaves similar to that of N and therefore, sometimes difficult to distinguish the difference by visual observations. Potassium deficiency is visible as intervenal chlorosis leading to yellowing but symptoms starting at leaf tips of lower leaves. On the other hand, magnesium deficiency also caused intervenal chlorosis on lower leaves but characterized by an orange - yellow colour. In

contrast, iron deficiency shows yellowing symptoms in upper leaves as iron being a less mobile element, does not move within plants when availability through the roots is limited due to deficiency in the soil.

## CONCLUSION

Extension officers and farmers must carefully examine the rice fields with yellowing symptoms to diagnose if lack of N could be a possible cause. Presence of healthy and green colour plants at borders (where more nutrients are available), in fertile patches of the field or in places where plant population is low and appearance of yellowing plants in association with poor root and shoot growth in high plant density area of the field is a clear indication of inadequacy of nutrients in the soil. Farmers must be encouraged to apply recommended levels of fertilizer at the correct time and correct dosage, together with use of organic manure wherever possible to increase the fertilizer use efficiency.