Agric. Res. J. Kerala, 1984, 22 (1), 90–92

INFLUENCE OF NITROGEN ON THE PARTITIONING OF ASSIMILATES BETWEEN PANICLE AND LEAVES IN UPLAND RICE VARIETIES*

Attempts to increase yield capacity and photosynthetic capacity appear to be equally important for further increases in grain yield in rice (Yoshida, 1972). A greater distribution of assimilates to the developing panicles may produce larger panicles. But the mechanism of partitioning of assimilates between panicles and leaves and method of controlling the partitioning of assimilates are not known. Yoshida (1972) has pointed out that the partitioning of assimilates between the developing panicle and leaves is probably under hormonal control. McIntyre (1964) could eliminate hormonal control of apical dominance by nitrogen fertilization. The present investigation was taken up to find out whether nitrogen can eliminate hormonal control over the partitioning of assimilates between developing panicles and leaves in rice.

The materials used in this study were drought resistant, tall, upland, local improved rice varieties, Ptb 28 (Kattamodan), Ptb 29 (Karuthamodan), Ptb 30 (Chuvannamodan) and Ptb 42 (Suvarnamodan). An experiment was laid out at the College of Agriculture, Vellayani with the above varieties and five levels of nitrogen, viz., 0, 10, 20, 30 and 40 kg/ha.

Increase in the level of nitrogen resulted in an increase in flag leaf area and the total area of the top four leaves (Tables 1 & 2). These results agree well with those obtained by Murata and Matsushima (1975) and Palaniswamy (1975). The increase in spikelet number brought about by an increase in nitrogen is similar to those recorded by Prasad and Sharma (1973).

Since panicles and leaves, particularly the flag leaf grow at the same time, the distribution of assimilates between panicles and leaves will also determine the size of the panicle (Yoshida, 1972). Greater distribution of assimilates to the developing panicles may produce larger panicles. Since nitrogen promotes increase in leaf area as well as spikelet number, the influence of nitrogen, if any on the partitioning of assimilates between panicle and leaves is assessed by examining the comparative growth of panicle and leaves. The changes in the ratio of the number of spikelets to total leaf area and ratio of flag leaf area to number of spikelets were taken as the indices of the comparative growth of panicle and leaves. Table 1 shows that the level of nitrogen had no influence in changing these ratios, as the increases in panicle size and leaf area are paralleled. Thus nitrogen had no control over the partitioning of assimilates between panicle and leaves in rice. Yoshida (1972) is of the view that partitioning of assimilates between developing panicle and leaves is probably under hormonal control. Attempts to understand the mechanism of partitioning and to find means of controlling it should receive more attention.

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* Part of the M. Sc. (Ag) thesis of the senior author submitted to the Kerala Agricultural University, 1981.

Varieties differed in flag feaf area and total leaf area significantly. Ptb 42 had the largest flag leaf area and total feaf area and it was followed by Ptb 28, Ptb 30 and Ptb 29 in order. In the number of spikelets Ptb 42 was significantly superior to Ptb 28. Ptb 28 was sup3rior to Ptb 29 and Ptb 30, which were on par. The highest ratio of number of spikelets to leaf area was recorded by Ptb 28 which was followed by Ptb 42, Ptb 29 and Ptb 30 in order.

The highest ratio of flag leaf area to the number of spikelets was recorded by Ptb 30 while Ptb 29 and Ptb 42 were on par. Ptb 42 and Ptb 28 were also on par.

Table 1

Summary of ANOVA, F values

Source	Flag leaf area	Total leaf area	Total No, of spikelets	Ratio of No. of spikelets to leaf area	Ratio of flag leaf area to No. of spikelets
V	1063. 28**	15498.769**	20399.52**	0.16710**	0.2410**
N	95.365**	2158.645**	978.64**	0.00418	0.00215
VN	23.383**	427.383**	315.87**	0.00880*	0.00317*
Error	6.926	16.614	116.72	0.00390	0.00130

* Significant at P = 0.05

** Significant at P - 0.01

Table 2

Effect of N on the comparative growth of leaves and panicle

Level of N kg/ha	Flag leaf area sq m	Total leaf area sq m	Total No. of spikelets	Ratio of No. of spikelets to leaf area	Ratio of flag leaf area to No. of spikelets
0	32.283	143.801	106.17	0.730	0.313
10	34.908	155.388	119.42	0.759	0.299
20	34.442	154.473	115.25	0.738	0.307
30	36.691	171.261	128.42	0.741	0.392
40	39.816	176.704	126.67	0.708	0.327
CD (0.05)	2.171	3.363	8.89	—	—

സംഗ്രഹം

വളർച്ചക്കാവശ്യമായ പോഷകങ്ങളെ നെൽച്ചെടിയിലെ ഇലകൊഞ്ഞും കതിരിനുമായി വിഭജിക്കുന്നതിൽ പാകൃജനകത്തിന് നിയന്ത്രണമില്ല.

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