B-70: Response of open pollinated and hybrid maize varieties to added nitrogen under dry zone rainfed upland conditions

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Hybrid maize has been introduced to the dry zone farmers very recently at demonstration level. Agronomic practices have not yet been formulated for the hybrid to match the present farming practices in maize cultivation. An investigation was carried out to determine the response of hybrid maize to added nitrogen (N) in comparison to improved open pollinated maize varieties (opv) under rainfed conditions in the dry zone of Sri Lanka.

Field experiments were conducted at Field Crops Research and Development Institute, Maha Illuppallama, as well as in the farmers' fields in the Anuradhapura district. Two varieties of hybrid and opv maize, Pacific ii and Bhadra 1 respectively were tested at 4 N levels (0, 50, 100 and 150 kg N/ha) as factorial experiment in RCB design with 3 replicates at Maha Illupallama. In addition, 3 N levels (0, 65 and 115 kg N/ha) were tested as non replicated multilocational adaptive research trials at 6 locations namely, Parasangaswewa, Palagala, Wilachchiya, Galenbindunuwewa, ittewewa and Mankadawala in Anuradhapura district. N was applied as urea in 2 split as 30% at planting and the rest as top dressing at 4 weeks after planting. In addition to N each treatment received 55 kg P_2O_5/ha and 30 kg MOP/ha at planting. Other cultural practices were adopted as recommended in crop management. Experiment commenced at the onset of 94/95 Maha rains. Plant population at the experimental plot was maintained at the spacing of 60 x 60 cm at 2 plants/hill. Grain yield and dry matter yield were recorded. In addition rainfall, day temperature and sunshine duration were measured during the experimental period at Maha Illuppallama.

Total rainfall received during the study period was 772 mm and the distribution on monthly basis was 416, 159, 114, and 82 mm in October, November, December and January respectively. Similarly monthly average day temperature and sunshine duration observed from October onward were 30.7, 29.3, 28.7 and 29.7 and 6.4, 4.4, 6.1 and 7.3 respectively. Climatic parameters measured during 94/95 Maha season were in accordance with normal Maha season in the dry zone.

Results in the Maha Illuppallama trial indicates that, opv and hybrid produced similar grain yields at 0 kg N/ha. However, grain yield of the hybrid is significantly higher than the opv at N levels 50, 100, and 150 kg/ha. Consequently, hybrid grain yields at 50 and 100 kg N/ha are equal to opv at 100 and 150 kg N/ha respectively. In addition, both varieties linearly responded to the added N. Gradients of the increasing trend of the response are 0.026 and 0.022 for hybrid and opv respectively. Similarly, both varieties produced high grain yield with increasing N levels at farmers fields. Results at Maha Illuppallama and farmers fields further showed that hybrid produced 30 and 22 % yield increase respectively compared to opv.

Results in dry matter production of the 2 varieties at Maha Illuppallama were opposite. Opv produced greater dry matter than hybrid at 150 kg N/ha. However, dry matter production of opv and hybrid was similar, at N rates of 0, 50 and 100 kg/ha. Linear relationships were observed between N levels and dry matter production of the 2 maize varieties, and gradients of the increasing trend were 0.822 and 1.305 for hybrid and opv respectively.

Both varieties have the ability to respond to higher level of N under prevailing climatic conditions during the period of investigation. Hybrid has a potential to perform well over opv under the present farming practices in the dry zone.