

1.1.4 Ndlangamandla George M. (1999). The performance of maize (*Zea mays* L.) cultivars under different fertilizer rates and soil types in two agro-ecological regions in Swaziland. (Supervisors: Dr. D. M. N. Mbewe and Dr. O. A. Yerokun).

A blanket fertilizer recommendation is used for each agro-ecological zone in Swaziland irrespective of soil type and maize genotype. The objective of the study was to determine the response of grain yield and some yield components of maize cultivars to fertilizer rates applied to different soils in the Highveld and Middleveld agro-ecological zones of the country. Four sites with different soil types were selected. The soils differed in texture, cation exchange capacity, pH, organic matter content and in the content of N, P, K and Ca. A split-plot design was used with fertilizer rate as the main plot factor and maize cultivar as the sub-plot factor. Four fertilizer rates were used, i.e., 0, 200, 400 and 600 kg/ha of compound fertilizer 2:3:2 (22) and a top-dressing of 45 kg N/ha with L.A.N. (28% N). The top-dressing was not applied to the 0 kg/ha rate. Five maize cultivars were used, i.e., R201; RO413 and SSM2039; PAN6479 and PRB3427, chosen according to their maturity periods from early to late. The parameters measured were grain yield, canopy height, canopy width, harvest index and N, P and K concentrations in the leaves and grain. The harvest index (HI), plant canopy height and canopy width each differed ($P \leq 0.01$) between the sites. The canopy heights for Dwalile, Hawane (Highveld), Mbelebeleni and Mdayane (Middleveld) were 129.6, 205.4, 159.1 and 178.7 cm, the canopy widths were 77.6, 116.0, 114.5 and 112.6 cm while the HIs were 54.4, 36.9, 42.4 and 47.0%, respectively for the sites. The maize cultivars also differed ($P \leq 0.01$) in the HI, canopy width and height. The cultivars PHB3427 and R201 had higher and wider canopies across the sites. Each of the parameters differed significantly between the fertilizer rates and tended to increase as fertilizer rate increased. The cultivars PAN6479, PHB3427, R201, RO413 and SSM2039 had canopy heights of 166.6, 191.9, 180.0, 145.7 and 156.9 cm, respectively. The canopy widths were 99.3, 110.2, 108.5, 103.9 and 103.9 cm while the HIs were 43.2, 47.9, 49.0, 43.7 and 42.0%, respectively. The [N], [P] and [K] in the grain and leaf differed ($P \leq 0.01$) between sites, fertilizer rates and the maize cultivars. The grain [N] and leaf [N] were higher at Dwalile and Hawane but lower at Mbelebeleni. Grain [P] and leaf [P] were lower at Dwalile and Mbelebeleni, respectively whereas they were higher at Mbelebeleni and Dwalile respectively. Grain [K] was higher at Hawane but lower at Dwalile and Mbelebeleni whereas leaf [K] was

higher at Mbelebeleni but lower at the other sites. The average grain yields of 2.36, 2.74, 3.34 and 3.23 m/ha for Dwalile, Hawane, Mbelebeleni and Mdayane, respectively, were different ($P \leq 0.01$). This was a reflection of the differences in the respective sites with respect to soil type, residual fertility and climate. The yields differed between the fertilizer rates per site ($P \leq 0.01$) but increased with fertilizer rate. The average yields across the sites were 1.38, 2.46, 3.52 and 4.32 m/ha for the 0, 200/150, 400/150 and 600/150 kg/ha rates of fertilizer, respectively. The cultivar R201 gave a higher ($P \leq 0.05$) yield at Mdayane than at the other sites, showing that some cultivars were affected by sites. From the results it can be concluded that the grain yield response was optimum at the 400 kg/ha rate of fertilizer irrespective of cultivar as observed at Dwalile, Mbelebeleni and Mdayane. Some cultivars can be tentatively recommended for some specific sites as the results showed that the cultivar R201 performed better ($P \leq 0.05$) at Mdayane compared to the other sites.