Thesis Title Responses of Groundnut Lines with Different Maturities to Environmental Conditions in Three Growing Seasons

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Abstract

This study was conducted with the objective to examine the responses of groundnut lines with different maturities to different environmental conditions of three growing seasons (early-rainy season, May 29,-October3, 1986; mid-rainy season, July 22,-November 19 1986; and after-rice, November 14, 1986- March 17, 1987) season without irrigation) The maturity groups were early (about 95 days), medium (about 105 days) and late (about 120 days). Two experiments were conducted. The first experiment was a yield trial of five early-maturing lines, six medium-maturing lines, and five late-maturing lines in the three seasons. In the second experiment, two lines with different yield levels from each group were examined for their growth and development in the three seasons.

The results indicated that groundnut lines in the different maturity groups showed different responses to the growing seasons in almost all the yield and yield compenent characters. Lines in the same group also responded to the growing seasons differently in most of the characters. Only 100-seed weights and days to maturity showed high correlations among data obtained from the three seasons. Pod yields in early and mid-rainy seasons also showed a moderately high correlation, the rest showed no correlation among the growing seasons.

Differences among early and late-maturing lines in growth and development pattern indicated that early-maturing lines were more determinated than late-maturing lines. Some medium-maturing lines had similar growth and development pattern as early-maturing lines, but some had a similar pattern as late maturing lines. In early-rainy season planting, drought stress at flowering stage resulted in a reduction in flowering and a failure of pegs to be formed. Effect of drought stress on flowering was more severe in early-maturing lines than in late-maturing lines. More flowers were produced when the dry spell was over, and most pods came from these flowers. As a consequence, pegs and pods were formed later, resulting in a delay in maturity and a high percentage of young pods at harvest. Vegetative growth was also continued for a period during pod development. In mid-rainy season planting, there were good rains during flowering stage, and flowers were produced continuously. Most of the pods were produced from flowers which came out early. Drought stress at the later part of the season sped up maturity resulting in a high percentage of mature pods at harvest. However, a high percentage of

shrivelled seeds was observed in late-maturing lines. Vegetative growth ceased during pod development stage, and there was a translocation of photosynthates from leaves and stem to pods. Low number of flowers were produced in the after-rice season as temperature and relative humidity were low during the flowering stage, but the percentage of flowers which formed pegs was high. Peg and pod development was slower than in the mid-rainy season, causing a delay in maturity and a high percentage of young pods at harvest. Vegetative growth was also continued during pod development stage.

Although the environmental factors in the different seasons affected lines in the different maturity groups differently, the individual lines appears to have certain compensation mechanism which could buffer such effects. As a result, there was no clear pattern of environmental effects on yield of the different maturity groups, except high percentage of shrivelled seeds in late-maturing lines grown in mid-rainy season. Late maturing lines are, thus, not suitable for mid-rainy season planting. These results suggested that results from yield evaluation in one season could not be used to predict the relative yield performances in another season, only prediction of the relative seed size and maturity would be possible. Therefore, in developing cultivars suitable for a particular season, evaluation and selection must be done in that season; or if the aim is to develop cultivars which could be used for all seasons, the lines must be evaluated for their performances in all seasons. However, other seasons which are not the target seasons could still be used in advancing generations and selection for qualitative characters less affected by environments in early generation segregating populations.