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“Bridging the gap between increasing knowledge and decreasing resources”

Considering the Effects of Temperature and Photoperiod on the Growth and Development of Lablab (*Lablab purpureus* L.) in the Search for Short-Season Accessions for Smallholder Farming Systems

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Abstract

Legumes have gained increased importance in smallholder farming systems of sub-Saharan Africa due to their contribution to household nutrition and health and their ability to prevent the depletion of already poor soils. Unpredictable and highly variable rainfall make short-season grain types a promising option for risk reduced farming in semi-arid areas. The ability to predict phenological development and in particular time to flowering is crucial information needed estimating the production success of new accessions in new environments. Therefore the photoperiod-sensitivity of ten promising short-season *Lablab purpureus* L. accessions (CPI 525313, CPI 52533, CPI 52535, CPI 52535, CPI 52552, CPI 52554, CPI 60795, CPI 81364, CQ 3620, Q 6880B) were evaluated for their response to varying temperature and daylength regimes in field trials in Limpopo province, South Africa and under controlled conditions in growth chamber experiments in Göttingen, Germany. Photoperiod sensitivity was quantified using the triple-plane rate mode of flowering response. Further, time to flowering was expressed in thermal time units. Piecewise regression analysis was used to estimate the critical photoperiod (P_c) above which time to flowering was delayed significantly. Relatively high variation of time to flowering among and within accessions in days after planting (DAP) was observed, ranging from 60 to 120 depending on sowing date or daylength/temperature regime. A clear positive effect of temperature on growth and development of the tested accessions could be proven, and time to flowering expressed as thermal time were consistent for the tested accessions, ranging from 600 to 800 °Cd for day length <13 h. At daylength conditions of ≥ 13 h (temperature 28 °C) development towards flowering was delayed significantly for the accessions CPI 52513, CPI 52535, CPI 52554 and CPI 60795 with vegetative growth continuing for >100 DAP. Consequently the tested lablab accessions can be rated as having a weak photoperiod response and can be classified as short-day plants (SDP). From 30°N to 30°S daylength does not exceed 13 h and the tested lablab accessions can therefore be recommended as short-season grain legumes for cultivation in small-holder farming systems in the tropics and subtropics including semi-arid areas of sub-Saharan Africa.

Keywords: Flowering time, *Lablab purpureus* L., phenology, photoperiod-sensitivity, photothermal response