

Latitude effect on the development of photoperiodic sensitive sorghum

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Matching phenology with favourable abiotic and biotic conditions is a prerequisite for good varietal adaptation. That is particularly important in a context of climate change because the temperature increase is likely to modify the precocity of the varieties. The forecast of the phenology of photosensitive cereals is complex because flowering depends on both temperature and day length. The effects of photoperiod and temperature can be studied by trials in phytotron, but, high cost prohibits the use of this technique where large numbers of varieties are handled. The day length varies with latitude. Multi-location field trials can be employed for creating a range of environments, but in this type of trials, the great variability of the environments (mainly photoperiod x temperature interaction) often masks the photoperiodic effect. The maturity of the photoperiodic varieties is especially very variable according to the sowing date. Trials comprising of several sowing dates facilitate the study of the effect of small variations of photoperiod on phenology. The objectives of this work are to compare these two last approaches by precisely measuring the effect of the latitude on the development of selected varieties of sorghum sown at staggered planting dates and to verify the precision of our models to predict sorghum maturity. A field experiment in Mali was conducted at the experimental sites of Cinzana (13°15' N), Sotuba (12°39' N) and Farako (11°13' N) in 2009 and 2010. Six sorghum cultivars representing the diversity cultivated sorghum in Mali were sown on three dates (10th June, July and August). The study is related to the phenology and the phyllochrone on the main stem. The effect of latitude on the phenology was underestimated by the existing models. Although the day length difference between Cinzana and Farako is less than 8 minutes, for some varieties we observed a variation in the duration of the crop cycle of up to two weeks. Thus comparable small latitudinal differences highly affected on photosensitivity. However, some varieties respond non-photosensitive in Farako and photoperiodic in Cinzana. To determine the optimal areas for the varieties in West Africa and to forecast the effects of climate change, it is necessary to develop a new model that is able to predict the effects of both, sowing date and latitude. Further research is needed to understand physiological response mechanisms of the pronounced latitude effects on phenology of sorghum.

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