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## Variation in Phenological Development and Yield Performance of Rice Genotypes under Cold Stress in the Fogera Plain, Ethiopia

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### Abstract

Rice, *Oryza sativa* L., is the most rapidly growing food source in sub-Saharan countries in general and in Ethiopia in particular. Rice cultivation is a recent phenomenon in Ethiopia. The national average rice productivity is estimated to be 2.8 t ha<sup>-1</sup>, which is much lower than the world average rice productivity of 4.4 t ha<sup>-1</sup>. Cold stress is one of the main contributing factors for the low productivity in rain fed lowland rice production. In the study presented here, thirty rice genotypes were tested in 2016/17 cropping season in a randomised complete block design with three replications to evaluate the variability in phenological development and yield performance due to cold stress in the Fogera plain.

The weather data was recorded at 30 minutes interval throughout the cropping season. For majority of the tested genotypes, heading and flowering periods coincided with lower average minimum and maximum temperatures. We have clustered genotypes according to their phenological development and maturity period. Among the tested genotypes, the early genotypes (like Chomrhong, Machapaturi) matured in 120 days from sowing whereas the late genotypes (like WITA 4, SIM 2 Sumadil) matured in 180 days. Majority of the tested genotypes matured from 140 to 160 days after sowing. The time interval for phenological development (from 50% emergence to maturity) varied among genotypes though they have similar maturity periods. The early genotypes showed a higher percentage of filled grains than the medium duration genotypes. Late maturing genotypes for which the heading and flowering stages coincide with night-time cold spells (less than 10/°C) showed a significantly higher percentage of unfilled grain, resulting in a lower yield performance. The results of this study will help to identify potential varieties with a given maturity period to cope with the future climate variability in Fogera plain.

**Keywords:** Cold stress, genotypes, lowland rice, phenology, rain fed