

## Crop weather relationship in *rabi* sorghum

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### ABSTRACT

An experiment was conducted for five years on sorghum by using four different sowing windows to study the relationship between weather parameters and yield in *rabi* season. *Rabi* sorghum sown at MW 39 (24-30 Sept.) produced maximum pooled grain (850 kg ha<sup>-1</sup>), fodder (29.06 q ha<sup>-1</sup>) and total monetary returns (Rs.13781 ha<sup>-1</sup>). However, the crop sown at MW 40 was also produced the on par yields with crop sown at MW 39 and of high degree of sustainability. Tmax, Tmin, RHI, RH II, WS, rain and Epan had showed significant positive association with grain yield. Tmin at emergence to 4<sup>th</sup> leaf stage, Epan at panicle initiation to flag leaf stage BSS at soft dough to hard dough stage and Epan at hard dough to physiological maturity showed positive contribution in grain production of *rabi* sorghum.

**Key words :** *Rabi* sorghum, Weather parameter, Correlation, Stepwise regression.

### INTRODUCTION

Sorghum (*Sorghum bicolor* L) is a staple grain crop in India and many countries of central Africa. It is an important dryland crop grown under erratic rainfall conditions. It is less sensitive to weather changes for longer period. With varying uncertain seasonal conditions, extreme variation in varietal performances is a serious matter for growers. The tolerance conditions are of prime importance than mere high yield potential under regular adequate water supplies. Broadly, there is a need to identify and study the major limiting climatic and physiological factors for agronomic aspects of different crops, crop growth stages and farming system in adjusting with new approaches for optimum utilization of the existing resources (Kakade, 1985).

Hence, by keeping in view, this experiment was conducted to study the effect of temperature, sunshine and moisture stress on phenological stages of crop growth, to study the effect of water availability on crop growth and development of various plant components and to validate predictive model for the crop growth and development of sorghum

### MATERIALS AND METHODS

The experiment was carried out for five years during the rainy season from 1999 to 2004 at Dry Farming Research Station, Solapur (17°41' N 75°41' E and 486 m MSL) on medium black soil (60 cm soil depth). The sorghum crop was sown on eight different dates. The sowing dates were S1 (MW 36), S2 (MW 37), S3 (MW

38) and S4 (MW 39), S5 (MW 40), S6 (MW 41), S7 (MW 42) and S8 (MW 43). The experiment was laid out in randomized complete block design with four replications. The soil of the experimental site was low in organic carbon (0.34%), medium in phosphorus (17.7 kg ha<sup>-1</sup>) and high in potash content (542 kg ha<sup>-1</sup>) with neutral pH (7.1). The crop was fertilized with 50:25:0 kg NPK ha<sup>-1</sup>. All the agronomic practices recommended by MPKV, Rahuri (MS) were adopted to raise the crop.

The phenophase wise correlation and the stepwise regression analysis among the weather parameters at different phenophases with yield were performed separately according to methodology described by Snedecor and Cochran (1967.) The weather parameters which showed significant correlation with yield were entered in this analysis to derive prediction models separately. However, only the best suited equations of correlation and regression are elaborated here.

In the year 1999, 2000, 2001, 2002 and 2004 precipitation was 511.5 mm, 630.6 mm, 600.2 mm, 644.3 mm and 638.4 mm in 40, 46, 37, 49 and 43 days, respectively. This precipitation was deficit by 29 %, 13 %, 17 %, 11 % and 12 % during 1999, 2000, 2001, 2002 and 2004 than normal, respectively. The rainfall was highly inadequate with high degree of uneven distribution.

The maximum temperature varied during 1999 to 2004 in between 28.6 to 43.4°C with 34°C average and minimum 11.2 to 28.3°C with 20.1°C average. The morning and afternoon humidity was 39 to 95 % with an average 75 % and 22 to 72 % with an average of 45 %,

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