Performance of SPV 2217 variety of sorghum in the North-eastern dry zone of Karnataka

Abstract: Most of the *rabi* sorghum in the country and Karnataka is cultivated under receding soil moisture conditions, which is subjected to drought at various growth stages. In this context, the growing of drought-tolerant genotypes which are adaptable to water-limited conditions is the need of the hour. With this view, front-line demonstrations were conducted to popularise the variety (SPV 2217) in the Suntnoor village of Aland taluka, Kalaburagi District. The results of front-line demonstrations indicated a higher yield (22.75 q/ha) of SPV 2217 as compared to the local variety (19.10 q/ha) due to the maintenance of greenness at physiological maturity. Due to higher yield, higher income was obtained and that led to a higher B:C ratio (2.42) as compared to the local variety (2.06). So, this improved drought-tolerant variety of sorghum can be effectively utilized by the farmers for higher productivity as compared to the local variety.

Keywords: Drought tolerant, Front line demonstrations, Local Variety, SPV 2217 and Sorghum

Introduction: Sorghum [*Sorghum bicolor* (L.) Moench] which is considered as the king of millets and is widely grown in more than 105 countries, including India. It is an important crop worldwide, used for food (as grain and in sorghum syrup or sorghum molasses), animal fodder, the production of alcoholic beverages and biofuels. Among the cereals, sorghum ranks fifth in terms of area and production in the world after wheat, maize, rice and barley. Globally, sorghum is cultivated on 41 m ha with 64.20 m t of production. In India, sorghum is cultivated during *kharif* (southwest monsoon) and *rabi* (post-monsoon). *Rabi* sorghum is the major food and fodder crop of water scarcity zones and an important dryland crop grown in the Deccan plateau in the states of Maharashtra (1.10 m ha), Karnataka (0.83 m ha) and Andhra Pradesh (0.14 m ha) with an annual production of 1.74 m t and productivity of 744 kg ha^{-1} (Anon., 2019).

The *rabi* sorghum is generally cultivated under stored and receding soil moisture with raising temperature at the post-flowering stage. Hence, it experiences both the soil and atmospheric droughts which is one of the major constraints responsible for destabilizing the *rabi* sorghum productivity. In addition, some of the important factors that contribute to low yield include; extreme weather conditions, low inputs, poor fertility of the soil and limited availability of improved varieties or hybrids with significant yield superiority over farmer's

landrace varieties. The major reduction in the yield is due to the drought stress during the developmental stages of the crop (Agboma *et al.,* 1997). Drought stress affects almost every stage of plant growth. However, damaging drought effects were more prevalent in sorghum when coinciding with different growth stages such as panicle initiation and anthesis (Sharma and Singh, 2003). The damaging impact of drought depends on its severity and also on the stage of crop growth at which it occurs (Jongdee *et al.,* 2002).

The majority of *rabi* sorghum in the country is grown under receding soil moisture conditions and is commonly exposed to pre or post-flowering moisture stress. Drought-tolerant genotypes that can adapt to water-limited situations are urgently needed in this scenario. Even while genotypes adapted to dry environments differ in their genetic potential in their reaction to available moisture, some may be resistant to pre-flowering moisture stress and others to post-flowering moisture stress, depending on the kind of soil and climatic conditions (Sinaki *et al.,* 2007). With this view on *rabi* sorghum cultivation, a front-line demonstration was conducted with a newly released drought-tolerant variety i.e., SPV 2217.

Material and Method: Village climate risk management committee (VCRMC) was constituted under National Innovation on Climate-resilient Agriculture (NICRA) project in Suntnoor village. Participatory Rural Appraisal (PRA) method and group discussions with VCRMC were held by the team of ICAR-Krishi Vigyan Kendra, Kalaburagi-1 (Karnataka, India) scientists to discuss the various problems encountered by farmers while growing Sorghum. The major problems encountered by farmers were the lack of improved drought-tolerant varieties and cultivation practices. To address these issues, 50 front-line demonstrations were conducted in farmers' fields of Suntnoor village in Aland taluka of Kalaburagi district during *Rabi* 2021-22 under NICRA by ICAR-Krishi Vigyan Kendra, Kalaburagi-1. There were two treatments *viz.,* use of local variety (Check) and Improved variety-SPV 2217 (Improved variety) with similar cultivation practices. Each demonstration was conducted in an area of 0.4 ha adjacent to the plots of the check. Data were collected from demonstrated fields and farmers' field.

Result and Discussion: Evaluating a crop's performance in terms of economic output provides a clear picture of the crop's potential under certain conditions. At certain growth stages, grain yield and yield components are more sensitive to water deficits. In *rab*i decline in grain yields due to moisture stress is a common occurrence. Depending on the time and intensity of stress in relation to plant phenology, moisture constraint influences yield by inhibiting both source and sink (Blum, 1996). Major yield parameters such as panicle weight,

panicle length, and grain mass are associated not just among themselves, but also with a number of other physiological parameters that influence grain production (Blum, 1979).

In the present demonstration, SPV 2217 has performed better as compared to the local variety as a higher SPAD reading (53.2) was recorded in SPV 2217 as compared to the local variety (40.8) and due to this higher SPAD reading higher drought tolerance was maintained. Higher SPAD readings indicate higher chlorophyll concentration and in turn, this indicates higher photosynthetic activity and due to this higher yield can be obtained (Kandel *et al.,* 2020). In our demonstration, due to a higher SPAD reading higher test weight (24.2 g) was obtained due to better filling of grains as compared to the local variety (20.3 g) and thus higher yield was obtained in SPV 2217 (22.75 q/ha) as compared to the local variety (19.10 q/ha). Further, due to a higher yield higher B:C ratio was obtained (2.42). Similar results of higher yield in a drought-tolerant variety as compared to other variety was revealed by Lakshmi *et al*. (2020) and Ashoka *et al*. (2020). Front line demonstrations also revealed the semi-compact and longer panicle nature of SPV 2217 as compared to the local variety (Fig.1).

Conclusion:

From the above demonstrations it can be concluded that, due to the higher drought-tolerant capacity of SPV 2217 as compared to the local variety, this improved variety can be effectively utilized by the farming community for higher productivity compared to the local variety.

Fig.1. Difference between SPV 2217 and the local variety of sorghum

Table 1. Grain yield and economics of front-line demonstrations on Rainfed Pigeonpea at farmers' field

Year	2021-22	
Number of Demonstrations	50	
Test weight (g)	Demo	Check
	24.2	20.3
Average yield (q/ha)	Demo	Check
	22.75	19.10
% Increase	19	
B:C ratio	Demo	Check
	2.42	2.06

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