

## Grain yield potential sorghum hybrids for rice-fallows

The productivity of the sorghum of the district is very high (6.5 t/ha in 2010-11) in the country (average yield is < 1.0 t /ha) and the crop is exclusively cultivated in rice fallows under zero tillage condition. Considering this, it was felt essential to find out important reasons which, governs the differences in productivity and potentiality of land and varieties in respect of sorghum cultivation in rice fallows. Despite of its multiple uses as food, feed, fodder and bio-fuel, the area under grain sorghum in India has declined from 10.25 m ha in 1999-2000 to 5.82 m ha in 2014-15. The new opportunities and areas for sorghum cultivation are emerging. Sorghum in rice-fallows in coastal Andhra Pradesh, especially in Guntur and adjoining districts is gaining popularity among the farmers. Due to delayed transplanting of rice owing to late release of water and severe infestation of yellow mosaic virus and weeds in blackgram, the farmers are switching over to non-traditional crops like sorghum (in less irrigated areas) and maize (in assured irrigated areas) as an alternative to blackgram. Practically, the sorghum growers in this area are mostly inclined towards obtaining maximum monetary benefits from grain yields than others. Keeping these in view, proven hybrid along with package of practices were validated and demonstrated in several farmers' fields in the Guntur district as mentioned below.



During 2008-09, 13 sorghum cultivars viz., CSH 16, C 43, Laxmi, M35-1, CSV 216 R, MGS 55, MRS 4094, SPH 1148, SPH 1149, CSV 22R, MJ 4334, Sudama 333, CSH 15R were evaluated in rice-fallows under zero-tillage in farmer's fields at Ananthavaram village of Guntur district A.P. Sorghum hybrids Sudama 333 (8.44 t/ha), CSH 16 (7.80 t/ha), MJ 4334 (7.37 t/ha) and MRS 4094 (7.14 t/ha) registered the highest grain yield and recorded 43, 32, 25 and 21 % higher yields over check 'Laxmi' (5.89 t/ha), respectively. The increase in grain yield was due to increased panicle length and number of grains/panicle. The lowest grain yield (3.27 t/ha) was recorded with SPH 1148 followed by M 35-1 (3.56 t/ha) and SPH 1149 (4.5 t/ha) and the varieties.

During 2009-10, seven sorghum hybrids viz., CSH 16, CSH 23, CSH 15R, NSH 27, Kaveri 6363 and SBSH 151 and Mahalaxmi 296 which was commonly grown by the farmers, were evaluated in rice-fallows in farmer's field at Kondur, Athrota, Sripuram and Nellapadu villages in Guntur district of Andhra Pradesh. Results revealed that NSH 27 (7.75 t/ha), CSH 16 (7.43 t /ha) and Kaveri 6363 (7.40 t /ha) registered the highest grain yield than the check Mahalaxmi (7.11 t /ha). The increase in grain yield was, due to increased panicle length and number of grains/panicle and grain weight per panicle. Therefore, farmer was impressed about these performances. The lowest grain yield was recorded with SBSH 151 (6.97 t/ha), CSH 15R (5.95 t /ha) and CSH 23 (5.39 t /ha). As per the farmers' opinion, the reason to grow the sorghum crop in rice fallows was less requirement of irrigations (only 2) and low agrochemical inputs than the maize crop (4 irrigations). The black gram was highly susceptible to the yellow mosaic virus.

During 2010-11, six public and private sorghum hybrids viz., CSH 16, CSH 23, NSH 27, Kaveri 6363, Sudama 333 and Mahalaxmi 296 were evaluated in rice-fallows in farmer's field at Nallapadu, Sripuram and Athrota villages in Guntur district of Andhra Pradesh. Results revealed that all the demonstrated hybrids CSH 16 (8.61 t ha<sup>-1</sup>), Kaveri 6363 (7.61 t ha<sup>-1</sup>), Sudama 333 (7.11 t ha<sup>-1</sup>), NSH 27 (7.04 t ha<sup>-1</sup>) and CSH 23 (6.86 t ha<sup>-1</sup>) yielded better than the check Mahalaxmi 296 (6.63 t ha<sup>-1</sup>). Moreover, the significant increase (30%) was observed with CSH 16 (8.61 t ha<sup>-1</sup>). The increase in grain yield was due number of grains/panicle and grain weight per panicle and plant populations.

During 2011-12, six sorghum hybrids including advanced genotypes evaluated, 456AxCB134 (9.78 t ha<sup>-1</sup>), CSH 16 (8.62 t ha<sup>-1</sup>), 3660AxCB50 (6.96 t ha<sup>-1</sup>), 2295AxCB35 (6.56 t ha<sup>-1</sup>), and 3060AxB144 (6.46 t ha<sup>-1</sup>) yielded better grains than the check Mahalaxmi 296 (6.06 t ha<sup>-1</sup>). Moreover, the significant increase (51%) was observed with 456AxCB134 (9.78 t ha<sup>-1</sup>) and CSH 16 (8.61 t ha<sup>-1</sup>) over check Mahalaxmi 296 (6.06 t ha<sup>-1</sup>). The increase in grain yield was due more grain weight per panicle and number of panicles.

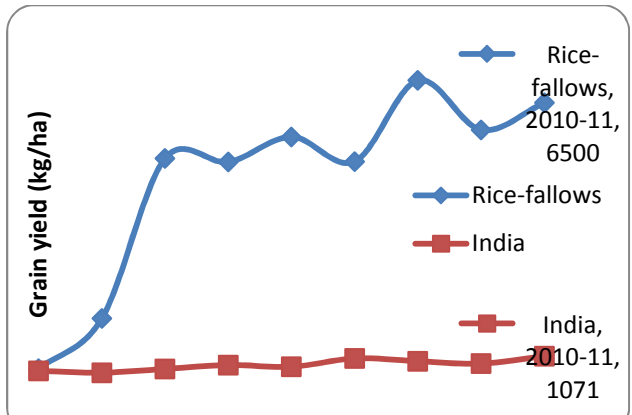
During 2012-13, for wide popularization of this hybrid, 110 demo trials were organized on 52 ha area in farmer's field at Kuchalapadu, Nallapadu, Sripuram, Athrota and Nandivellugu villages in Guntur district and Rajahmundry area in East Godavari district of Andhra Pradesh. Results revealed from all the demonstrations that CSH 16 (7.41 t ha<sup>-1</sup>) yielded significantly better than the locally popular hybrid Mahalaxmi 296 (5.25 t ha<sup>-1</sup>). Moreover, the significant increase of 41% was observed with CSH 16 over check Mahalaxmi 296. The increase in grain yield was due more grain weight per panicle and number of panicles per unit area. Though, the fodder was not much important to the farmers of this area, the same observations were also recorded in case of fodder yield. It was due to more plant populations and plant height of the cultivar. On an average, the demonstrated hybrid CSH 16 under FLDs in rice-fallows gave 51% higher net returns (Rs.44,102/- per ha) than the check Mahalaxmi 296 (Rs.21,659/- per ha) on the cost of Rs.51,850/- per ha. It was also resulted in to 0.87 more benefit-cost (B:C) ratio.

During 2014-15, total 50 field demonstrations on sorghum were organized on 20 ha in late *rabi* season i. e. in rice-fallows under zero-tillage in Guntur district of Andhra Pradesh during 2014-15. The demonstrations were undertaken in four major sorghum growing villages viz.,

Nandivellugu, Yerapalem, Athotta and Krapa of this district. Results revealed that CSH 16 (7.73 t ha<sup>-1</sup>) yielded significantly better under the field trials than the locally popular hybrid Mahalaxmi 296 (6.64 t ha<sup>-1</sup>). Moreover, the increase of 16% was observed with CSH 16 over the check Mahalaxmi 296. This hybrid CSH 16 also gave 77% higher net returns (Rs.55,361/- per ha) than the check Mahalaxmi 296 (Rs.31,227/- per ha) on the cost of Rs.45,092/- per ha.

During 2015-16, total 50 field demonstrations on sorghum were organized on 20 ha in late *rabi* season i. e. in rice-fallows under zero-tillage in Guntur district of Andhra Pradesh during 2015-16. The demonstrations were undertaken in eleven major sorghum growing villages viz., Duggirala, Vemuru, Kollipara, S.S.Palem, Burripalem, Nelapadu, Nandivellugu, Kolakaluru, Pedapalem, Athotta and Siripuram of this district. Results revealed that CSH 25 (6.48 t ha<sup>-1</sup>), CSH 16 (6.22 t ha<sup>-1</sup>) and CSH 14 (5.88 t ha<sup>-1</sup>) yielded significantly better under the field trials than the locally popular hybrid Mahalaxmi 296 (5.47 t ha<sup>-1</sup>). Moreover, the increase of 16% was observed over the check Mahalaxmi 296. The demonstrated hybrids also gave 43% higher net returns (Rs.48,245/- per ha) than the check Mahalaxmi 296 (Rs.33,738/- per ha) on the cost of Rs.37,345/- per ha.

The farmers prefer hybrids with high yield potential and medium height to avoid losses from lodging. The hybrid CSH 16 was highly promising and farmers preferred this hybrid due to high yield and medium height. The farmers are not using the sorghum stalks for fodder; rather, they are burning it in the field itself. As the water scarcity is becoming a major problem and as the sorghum is more drought tolerant than maize, the sorghum cultivation with high grain potential and medium tall hybrids, is gaining more popularity in rice-fallows.



Sorghum productivity of Guntur district (AP) in rice-fallows



Sowing of sorghum in rice-fallows



Sorghum crop of 30 day old in rice-fallows



A view of sorghum in rice-fallows