

Yield Analysis of Maize Hybrids Lenient to Turcicum Leaf Blight Disease in Southern Districts of Karnataka

MAIZE (*Zea mays* L.) is the third most important crop in the world after rice and wheat with an annual production of 600 million tonnes. Globally, maize is foremost crop in terms of area (over 140 million hectares) and the average productivity (more than 4 tonnes per hectare). It is anticipated that by 2020 the worldwide demand for maize will exceed that of wheat and rice (Puttramañnik *et al.*, 2011). In India the maize acreage is approximately 8.17 million hectares. However, with even paddy growing states moving towards maize cultivation, its acreage is also expected to go up (Senani *et al.*, 2011).

Turcicum leaf blight (*Exserohilum turcicum*), the disease is prevalent in cooler condition with high humidity of Jammu and Kashmir, Himachal Pradesh, Sikkim, West Bengal, Meghalaya, Tripura, Assam, Rajasthan, Uttar Pradesh, Uttarakhand, Bihar, Madhya Pradesh, Gujrat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. Long, elliptical, grayish green or tan lesions (2.5-15 cm) appear on lower leaves progressing upward (DOAC, 2013).

In the present investigation, yield analysis of Hema (NAH-1137) and Nithya shree (NAH-2049) were assessed in Karnataka state over state average yield from 2010 to 2012. Both Hema (NAH-1137) and Nithya shree (NAH-2049) are single cross hybrids [Parentage: NAI-137 (Female) × MAI-105 (Male) and SKV-15 (Female) × MAI-105 (Male), respectively], stay green type, maturing in 120-125 days and tolerant to Sorghum downy mildew, Turcicum leaf blight and Polysora rust (Shankara and Gowda, 2011). These hybrids released by Agricultural Research Station, Naganahalli, Mysore, Karnataka and Zonal Agricultural Research Station, V. C. Farm, Mandya, Karnataka, in 2010 and 2008, respectively. These hybrids recommended for the state of Karnataka for both irrigated and rainfed areas. The hybrid, NAH-1137 resembles to NAH-2047, Ganga-11, DMH-2 and Cargil-900M and the hybrid, NAH-2049 resembles Ganga-11 and NMH-145.

Experimental site: The experiment was conducted in 10 districts of Karnataka during *Kharif*-2010, 2011 and 2012. It consists of Bangalore rural, Chamarajanagara, Chickballapur, Chitradurga, Davanagere, Hassan, Mandya, Mysore, Shimoga and Tumkur districts.

Experimental design: The present experiment was supported by the University of Agricultural Sciences, Bangalore under the scheme of Frontline Demonstration (FLD's) in Southern parts of Karnataka. The Directorate of Maize Research (DMR) is implementing Frontline demonstration (FLD) programme, which is funded by Ministry of Agriculture, Government of India. In FLDs, recommended maize hybrids / hybrids along with a full package of practices and other technologies of maize are demonstrated in a farmer's field in an unit acre of land under close supervision of scientists for improving yield and productivity of corn. Turcicum leaf blight disease resistant hybrids [Hema (NAH-1137) and Nithya shree (NAH-2049)] were distributed to 10 districts of Karnataka for the three years to estimate the yield analysis, compared the estimated yield over state average yield and calculated the percentage increase of yield over state average yield by using the formula,

$$\text{Percentage Increase of yield} = \frac{\text{Yield differences}}{\text{Yield of the district}} \times 100$$

In *Kharif*-2010, out of 10 districts in Karnataka in the production of NAH-2049 maize hybrid, Hassan district stands first with a yield of 73.70 q / ha followed by Shimoga (67.38 q / ha) and Davanagere (67.28 q / ha). In 2011, Hassan district considered as a superior in yield of NAH-2049 with the production of 77.08 q / ha followed by Chikballapur district (72.92 q / ha) and Shimoga district (63.95 q / ha). While, during *Kharif*-2012, Chikballapur district stands first (80.74 q / ha) followed by Mandya and Chitradurga

districts with the production of 80.52 q / ha and 80.12 q / ha of NAH - 2049 hybrid, respectively (Table I). In contrast, yield of NAH - 1137 hybrid during *Kharif*-2010, Hassan district stands first with the production of 82.09 q / ha followed by Shimoga district (67.79 q / ha) and Davanagere district (64.00 q / ha). In 2011, Chikballapur district stands first with the production of 74.01 q / ha followed by Hassan district (73.72 q / ha) and Davanagere district (68.81 q / ha). In 2012, related to yield production of NAH - 1137, Hassan district occupy superior position (83.14 q / ha) followed by Chamarajanagara and Mandya districts with the production of 82.67 q / ha and 79.70 q / ha, respectively (Table I).

Overall production of NAH - 1137 and NAH - 2049 from *Kharif* - 2010 to 2012, Hassan district considered as a superior with the total production of 238.95 q and 229.44 q of yield, respectively (Table I).

The average yield difference of Hassan district (46.7 q / ha) over state average yield (27 q / ha) in the

yield production of NAH - 2049 hybrid showed that 67.43 per cent of yield increase in *Kharif* - 2010. This followed by Shimoga (40.38 q / ha of yield difference) and Davanagere districts (40.28 q / ha of yield difference) with a yield increase of 59.92 and 59.86 per cent, respectively over state average yield (Fig. 1). Similarly, in the production of NAH - 1137 hybrid, Hassan district (55.09 q / ha of yield difference) showed that 67.10 per cent of yield increase over state average yield (27 q / ha), followed by Shimoga (40.79 q/ha of yield difference) and Davanagere districts (37 q / ha of yield difference) with a percentage yield increase of 60.17 and 57.81 per cent over state average yield, respectively (Fig. 1).

In *Kharif* - 2011, the yield difference in the production of NAH - 2049 hybrid, Hassan district showed 40.78 q / ha of yield difference and it also showed that 52.90 per cent of yield increase over state average yield (36.6 q / ha). This followed by Chikballapur (36.62 q / ha of yield difference) and

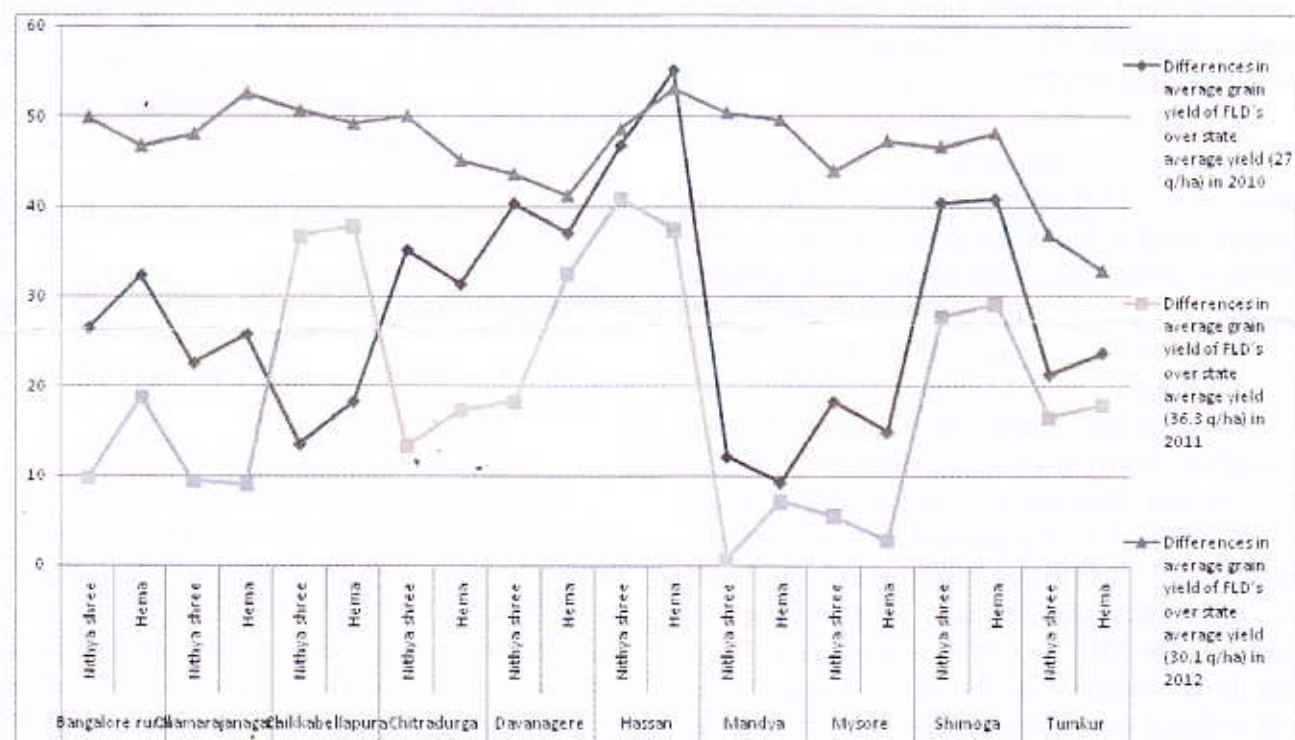


Fig. 1 : Differences in average grain yield of Hema and Nithya shree hybrids over state average yield during *Kharif*-2010 to 2012

TABLE I
Comparative analysis of yield of Hema and Nithya shree Maize hybrids over state average yield during Kharif - 2010, 2011 and 2012

Districts	Hybrid Name	Differences in average			Differences in average			Differences in average		
		Average yield in (q/ha) 2010	grain yield of FLD's over state average yield (27 q/ha) in 2010 (in q/ha)	Percentage increase over state average yield (%)	Average yield in (q/ha) 2011	grain yield of FLD's over state average yield (36.3 q/ha) in 2011 (in q/ha)	Percentage increase over state average yield (%)	Average yield in (q/ha) 2012	grain yield of FLD's over state average yield (30.1 q/ha) in 2012 (in q/ha)	Percentage increase over state average yield (%)
Bangalore rural	Nithya shree (NAH-2049)	53.49	26.49	49.52	46.05	9.75	21.17	80.00	49.9	62.37
	Hema (NAH-1137)	59.36	32.36	54.51	55.01	18.71	34.01	76.78	46.68	60.79
Chamarajanagara	Nithya shree	49.48	22.48	45.43	45.73	9.43	20.62	78.15	48.05	61.48
	Hema	52.76	25.76	48.82	45.30	9	19.86	82.67	52.57	63.59
Chikballapur	Nithya shree	40.44	13.44	33.23	72.92	36.62	50.21	80.74	50.64	62.71
	Hema	45.26	18.26	40.34	74.01	37.71	50.95	79.32	49.22	62.05
Chitradurga	Nithya shree	62.14	35.14	56.54	49.58	13.28	26.78	80.12	50.02	62.43
	Hema	58.33	31.33	53.71	53.63	17.33	32.31	75.21	45.11	59.97
Davanagere	Nithya shree	67.28	40.28	59.86	54.53	18.23	33.43	73.71	43.61	59.16
	Hema	64.00	37	57.81	68.81	32.51	47.24	71.28	41.18	57.77
Hassan	Nithya shree	73.70	46.7	67.43	77.08	40.78	52.90	78.66	48.56	61.73
	Hema	82.09	55.09	67.10	73.72	37.42	50.75	83.14	53.04	63.79
Mandya	Nithya shree	39.10	12.1	30.94	37.07	0.77	2.07	80.52	50.42	62.61
	Hema	36.25	9.25	25.51	43.45	7.15	16.45	79.70	49.6	62.23
Mysore	Nithya shree	45.27	18.27	40.35	41.86	5.56	13.28	74.05	43.95	59.35
	Hema	41.88	14.88	35.53	39.05	2.75	7.04	77.38	47.28	61.10
Shimoga	Nithya shree	67.38	40.38	59.92	63.95	27.65	43.23	76.68	46.58	60.74
	Hema	67.79	40.79	60.17	65.48	29.18	44.56	78.24	48.14	61.52
Tumkur	Nithya shree	48.29	21.29	44.08	52.85	16.55	31.31	66.98	36.88	55.06
	Hema	50.66	23.66	46.70	54.23	17.93	33.06	62.96	32.86	52.19

Shimoga districts (27.65 q / ha of yield difference) with a yield increase of 50.21 and 43.23 per cent, respectively over state average yield. Similarly, in the production of NAH – 1137 hybrid, Chikballapur district (37.71 q / ha of yield difference) showed that 50.97 per cent of yield increase over state average yield (36.3 q / ha), followed by Hassan (37.42 q / ha of yield difference) and Shimoga districts (29.18 q / ha of yield difference) with a percentage yield increase of 50.75 and 44.56 per cent over the state average yield, respectively.

Nevertheless, the analysis of yield difference in the year 2012 revealed that in the production of NAH – 2049 hybrid, Chikballapur district showed 50.64 q / ha of yield difference with an increase of 62.71 per cent of yield over state average yield (30.1 q / ha). This followed by Mandya (50.42 q / ha of yield difference) and Chitradurga districts (50.02 q / ha of yield difference) with a yield increase of 62.61 and 62.43 per cent, respectively over state average yield. Similarly, in the production of NAH – 1137 hybrid, Hassam district (53.04 q / ha of yield difference) showed that 63.79 per cent of yield increase over state average yield (30.1 q / ha), followed by Chamarajanagara (52.57 q / ha of yield difference) and Mandya districts (49.6 q / ha of yield difference) with a percentage yield increase of 63.59 and 62.23 per cent over the state average yield, respectively.

NAH–1137 and NAH–2049 maize grain yields in Karnataka are about 65 per cent higher in comparison with mean yields of the state. Besides the degree of soil fertility, precipitation quantities and their

distribution during a growing season significantly influence maize yields as well. This study will make use of aggregate data on yields. The data suggest strongly that, over the past three years, there has been a striking increase in the relative variability of grain yields in two maize hybrids (NAH–1137 and NAH–2049) in Karnataka state. The present study aims at examining the production and productivity of two maize hybrids in the state.

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