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Evaluation of American cotton genotypes for yield and yield contributing parameters

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Abstract
The experiment was laid out in a Randomised block design with three replications. There were twenty seven hirsutum genotypes of cotton namely AKH-8660, AKH-31, AKH-073,AKH-976, AK-32, AKH-2006-2, AKH-09-5, AKH-10-2, AKH-10-3, AKH-10-10, AKH-2012-8, AKH-2012-9, AKH-2013-1,AKH-2013-2, AKH-2013-3, AKH-1301, AKH-1302, AKH-1303, CNHO-12, GV-22, IC-358555,IC-357342,IC-359088, AKH-081, AKH-9916, PKV-Rajat and AKH-8828 were applied. The gross plot size was 1.8 ×6 m2. The yield parameters like no. of monopodia, no. of sympodia, no. of bolls per plant, boll wt.(g), Seed cotton yield (g/plant), Lint yield (g/plant),Ginning % and seed index (g) were influenced significantly by genotypes. Genotype AKH-1303 recorded significantly higher no. of sympodia (15.73), no. of bolls per plant (16.47/plant), seed cotton yield (62.89 g/plant), Lint yield (22.19 g/plant) and seed index (10.35g).

Keywords: Genotype, yield parameters, American cotton

Introduction
Cotton (*Gossypium* spp.) is an important fibre crop and plays a vital role as a cash crop in commerce of many countries. Cotton, also known as "King of fibres" plays a remarkable role in Indian economy. In cotton, now the yield levels have reached a plateau. So, the increased productivity of cotton could be achieved in developing countries like India by adopting cotton cultivars with intensive management practices. Cotton improvement work in India is directed towards evolving high yielding varieties and hybrids. Crop productivity in general, depends on potentiality of the genotypes and environmental interactions. Its associated characters decide genotypic ability. A precise, understanding of the crop yield build up is necessary for improvement of yielding ability of crop and its genotypes. The present study would be helpful for providing an idea about the performance and breeding behaviour of different genotypes in different environments and also helpful in classifying available genotypes depending upon morpho-physiological and yield parameters.

Material and Method
The experiment was conducted at experimental field of Cotton Research Unit, Dr. P.D.K.V., Akola, during 2016-17 and 2017-18. The topography of experimental field was fairly uniform, levelled and with a good drainage. The experiment was laid out in RBD design with three replications. The recommended package of practices was followed during the course of the investigation. The observations of yield parameters were recorded at harvest stage. i.e. number of monopodia, number of sympodia, number of bolls plant-1, single boll weight, seed cotton yield plant-1, Lint yield plant^{-1}, ginning % and seed index, (g). The seed cotton yield from each net plot was picked and the same weighed separately at each picking. The single boll weight was also recorded. The total seed cotton yield (g/plant) worked out by summation of a quantity of seed cotton picked in all pickings. The collected Pooled data was statistically analysed by Panse and Sukhatme (1954) method.

Results and Discussion
Yield contributing parameters
Number of monopodia plant^{-1}
The branches that do not bear fruit directly are the monopodial branches. Monopodial branches are also called vegetative branches and are always formed at the base of the cotton plant. Monopodial branches give the plant a bushy framework. Genotype CNHO-12 and IC-359088 (1.00) recorded least number of monopodia plant^{-1}. Khokhar *et al.* (2017) [13] found number of monopodia from 1.17 to 2.50 while Jamrao *et al.* (2017) ranged from 1.13- 1.00

number of monopodia per plant. These results were further supported by Meena *et al*. (2007) [14], N.U. Khan and G. Hassan (2011) [16], Farooq *et al.* (2013).

Number of sympodia plant^{-1}

Number of sympodial branches per plant recorded a significant differences among all cotton genotypes. The genotype AKH-1303 produced the higher number of sympodia (15.73) per plant. The lowest number of sympodia (7.60) per plant was recorded by AKH-8660.The differences in number of sympodia per plant can be attributed to differences in genetic makeup of cotton genotypes. Jamrao *et al.,* (2017) recorded number of sympodia in the range of 18.47 to 18.98 and also Khokhar *et al.,* (2017) [13] ranged from 11.20 to 22.43. Similar results obtained by Meena *et al.* (2007) [14], Giri *et al*. (2008) [8], Bhongle and Patil (2011) [4], Kaliyaperumal Ashok kumar (2011) [10].

Number of Bolls plant-1

Hirsutum genotypes significantly influenced the number of bolls plant-1. Genotype AKH-1303 recorded significantly more number of bolls plant-1 (16.47). Number of bolls plant-1 was significantly influenced due to different hirsutum genotypes. Khokhar *et al.,* (2017) [13] observed the range of 36.13- 22.03 bolls plant^{-1} in different American cotton genotypes. Similar results were also reported by Shakeel *et al.* (2015) [16], Singh *et al.* (2015) [20], Ullah *et al*., (2015) [21], Shahnaz memon *et al.* (2017) [15].

Single boll weight (g)

Boll weight has direct influence on seed cotton yield. The genotypes were significantly differed for boll weight. Maximum boll weight was reported in AKH-2012-9 (3.12 g) and minimum boll weight (2.20 g) was maintained by genotype AKH 8660. The differences among genotypes for boll weight might have been due to the difference in genetic potential of the cotton genotypes. The significant differences among genotypes for boll weight had also been recorded by Kaliyaperumal Ashok kumar (2011) [10], Singh *et al.,* (2012), Baloch *et al.,* (2014) [2], Dewan (2014) [5]. Farooq *et al*., (2017) [7].

Seed cotton yield plant-1 (g)

On an average of 62.89 (g) seed cotton yield plant-1 was collect in three picking. Treatment differences in respect of seed cotton yield plant-1 due to different genotypes were observed to be significant. Genotype AKH-1303 (62.89 g) recorded significantly higher weight of seed cotton yield plant-1. Yielding ability could be achieved through physiological characters i.e. larger leaf area index, higher chlorophyll content, higher dry matter production. The highest seed cotton yield produced by genotypes AKH-1303 might be due to the genetic ability and better photosynthetic efficiency through better source sink relations as reflected in harvest index. Kaliyaperumal Ashokkumar and Rajasekaran Ravikesavan (2013) reported maximum seed cotton yield observed in cotton genotype MCU (95.33 g/plant). Sekloka *et al.,* (2018) who observed 50.8 g seed cotton yield plant^{-1}.

Lint yield plant^{-1}(g)

Lint yield was significantly related to open boll number at harvest. In a short season environment, the retention of early squares and their development into open bolls was an important factor in lint yield production. In present investigation, the highest value (22.81 g/plant) of lint yield was recorded in genotype AKH-8828 and lowest value of lint yield 10.08 g/plant maintained by AKH-073.The results are in agreement with Singh *et al.,* (2011) who recorded lint yield per ha. In the range of 761.1 to 823.3 kg/ha and Dewan (2014) [5] recorded lint yield per ha. From 681 to 809 kg/ha.

Ginning out turn (%)

Significantly highest ginning outturn was recorded by the check AKH-8828 (41.31%) in *G. hirsutum* and lower (31.42%) ginning outturn observed in IC-359088. Ginning out turn was significantly influenced due to different genotypes. Similar results were obtained by Kaliyaperumal Ashok kumar (2011) [10] recorded highest value (36.2%) of ginning % in case of cotton cultivar surabhi and Baloch *et al.,* (2014) [2] who reported cotton cultivar IR-3701 ginned significantly i.e. 36.25 to 44.31% ginning outturn. Other researchers also reported the same results *viz.* Ullah *et al,* (2010), N.U. Khan and G. Hassan (2011) [11], Jamro *et al,.* (2017) [9], Khokhar *et al.,*(2017) [13] and Orawu *et al.*. (2017) [17].

Seed index (g)

There was significant differences among the genotypes in case of seed index. In genotypes significantly highest value (10.35 g). of seed index was recorded in AKH-1303 and lowest value (5.38 g) of seed index was found in AKH-10-10.The results are in agreement with Aziz *et al.,* (2011) [1] who recorded seed index in the range of 6.00 to 10.10 g while Bharati *et al.,* (2014) observed range from 10.35 to 10.76 g. and similar results were earlier reported by Ullah *et al.,* 2010), Kaliyaperumal Ashok kumar. (2011) [10], Kamel sajed and abbas ranjbar (2012) [12], Elayan Sohair *et al.* (2015) [6] and Martin Orawu *et al*., (2017) [17] in cotton genotypes.

Conclusion

Among the genotypes,AKH-1303 recorded significantly higher in no. of sympodia (15.73), no. of bolls per plant (16.47/plant), seed cotton yield (62.89 g/plant), Lint yield (22.19 g/plant) and seed index (10.35g). It may highly suitable for climatic condition of Vidarbha region.

Table 1: Mean performance of seed cotton yield and yield contributing characters of different hirsutum cotton genotypes.

Sr.no.	Genotypes	No. of monopodia	No. of sympodia	No. of bolls	Boll wt.(g)	Seed cotton yield/plant(g)	Lint yield per plant (g)	Ginning %	Seed index (g)
1	AKH-8660	1.10	7.60	7.85	2.20	30.96	11.81	37.86	8.65
2	AKH-31	1.10	13.13	7.08	2.80	29.35	10.37	35.17	8.48
3	AKH-073	1.03	13.60	11.85	2.77	28.34	10.08	35.35	6.52
4	AKH-976	1.17	11.47	14.92	2.72	39.01	13.91	35.56	9.15
5	AK-32	1.47	12.47	13.03	2.65	49.90	19.78	39.27	7.30
6	AKH-2006-2	1.13	12.47	8.45	2.77	51.48	18.4	35.63	6.91
7	AKH-09-5	1.10	13.60	10.98	2.87	50.79	19.03	37.42	7.34
8	AKH-10-2	1.07	12.20	9.65	2.20	51.06	20.96	37.98	7.27

9	AKH-10-3	1.20	13.67	10.28	2.94	54.12	18.15	33.34	8.22
10	AKH-10-10	1.43	12.93	11.02	2.59	41.54	14.93	35.77	5.38
11	AKH-2012-8	1.17	13.53	5.38	3.03	30.84	18.12	32.26	8.18
12	AKH-2012-9	1.43	14.13	11.36	3.12	48.29	20.7	34.49	5.97
13	AKH-2013-1	1.27	15.13	14.92	2.50	55.49	18.56	34.68	10.22
14	AKH-2013-2	1.50	15.40	15.52	2.69	55.78	14.32	35.29	9.54
15	AKH-2013-3	1.13	12.00	9.75	3.09	55.78	18.72	33.40	7.39
16	AKH-1301	1.03	15.13	12.67	2.78	54.03	18.08	33.28	8.36
17	AKH-1302	2.00	13.93	6.75	2.60	32.88	10.54	32.06	6.11
18	AKH-1303	1.03	15.73	16.47	3.11	62.89	22.12	35.17	10.35
19	CNHO-12	1.00	13.20	10.41	2.62	53.18	19.31	34.64	8.90
20	GV-22	1.30	11.53	9.89	2.52	46.40	16.57	35.62	7.57
21	IC-358555	1.70	13.47	7.35	2.87	46.26	16.83	36.24	7.89
22	IC-357342	1.83	13.33	9.02	2.67	47.02	17.53	38.10	6.11
23	IC-359088	1.00	14.50	12.65	2.58	53.62	18.5	31.42	5.94
24	AKH-081(check)	1.07	14.57	13.83	2.58	50.14	18.94	37.66	7.86
25	AKH-9916	1.10	14.50	10.64	2.69	36.63	14.34	38.71	8.44
26	PKV-Rajat (check)	1.03	14.17	7.51	2.96	49.73	18.93	37.77	8.29
27	AKH-8828(check)	1.10	13.23	8.11	2.94	55.22	22.81	41.31	7.45
'F' Test		Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE(m) ±		0.51	0.17	0.51	0.45	0.15	2.68	1.13	1.26
CD at 5%		1.45	0.49	1.45	1.28	0.42	7.62	3.2	3.59

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