Asian Journal of Plant Sciences

ISSN 1682-3974

science alert

ANSInet
an open access publisher
http://ansinet.com

Asian Journal of Plant Sciences 5 (4): 686-689, 2006
ISSN 1682-3974

Evaluation of Cotton Variety Yield Trials under Mediterranean Conditions in Turkey

[1]Volkan Sezener, [1]Taner Bozbek, [2]Aydın Unay and [2]Ilkay Yavas
[1]Nazilli Cotton Research Institute, Aydin-Turkey
[2]Department of Crop Sciences, Faculty of Agriculture,
Adnan Menderes University, Aydin-Turkey

Abstract: Distinction, Uniformity and Stability tests of the cotton advanced lines were performed by Nazilli Cotton Research Institute in Aegean Region of Turkey. Studies were conducted in three location of Aegean Region (Nazilli, Soke and Saraykoy), to evaluate the lint yield and fiber characteristics of 20 genotypes in 2005. The location × genotype interactions were significant for all characters except fiber length and fiber strength. Ozbek 142 S for lint percentage and Carmen for fiber strength were considerably the highest values for all locations. The most adaptable genotypes in yields were N/D-121 for Nazilli and Saraykoy, Ozbek 142 S for Soke.

Key words: Cotton, genotypes, adaptation, location, lint yield, fiber quality

INTRODUCTION

Turkey has annually produced an average of 3% of world cotton production. Turkish cotton has grown in three main regions: Aegean, Cukurova and Southeastern Anatolia. Aegean cotton generally is considered to be the best quality and is preferred for its longer staple length by the local textile industry. Cotton production in Aegean Region for 2005 is 254.000 tones at 176.000 ha and lint yield is 1445 kg ha^{-1} (Ozudogru and Cakaryıldırım, 2005).

All the cotton varieties grown in Turkey belong to species of *Gossypium hirsutum* L. (Gencer, 2000). Aegean cotton is grown in a range of micro-environments in irrigated conditions. Varieties for these region must be able to stabile for yield and fiber characteristics. When cultivars are compared in different environments, their performance relative to each other may not be the same (Eksi *et al*., 2000). It has been investigated many researches for specifying the growing locations suited to each new variety and each promising hibrid were the highest yield and quality could be achieved. Breeding lines are screened for resistance to disease, early maturity, yield, lint percentage and fiber quality.

In Turkey, varieties should be registered or production was permitted for making production, control and certification of varieties. The procedure of registration of varieties and production permission of candidate lines is carried out with regulation about registration of plant varieties (Soyler *et al*., 2000).

Profitability of cotton production depends more on lint yield than on any other single plant characteristic. Therefore, the primary objective of virtually all successful applied breeding programs is increased lint yield.

In this study, it was aimed that lint yield and fiber characters of 17 advanced lines and 3 standard genotypes were compared at three locations in Aegean Region of Turkey in 2005.

MATERIALS AND METHODS

In the present it was used total 20 genotypes which were 17 advanced lines and 3 standard genotypes have been widespread planting in this region. While N/SG 1001-119, N/D-121, N/D-101, NMS 39/11, MSİ 30/71, NGC, M25G, NCCH8/1, NCCH 9/2, NMCH11/4, advanced lines obtained breeding trial results from Nazilli Cotton Research Institute, ERKENCI ADU 1 and ERKENCI ADU 2 advanced lines obtained breeding trials from Agricultural Faculty of Adnan Menderes University. Besides Ahizka No: 10, Ahizka No: 11 and Ahizka No: 26 were Uzbekistan origin and VIKY (ES-20021), AFRICA (ES20025) advanced lines were Spanish origin. Nazilli 84 S has been planting 35%, Carmen 40% and Ozbek 142 S 8% which were used as standard cultivars in Aegean Region (Anonymous, 2005). The information of these plant materials were given in Table 1.

The present was conducted at different three locations of Aegean Region which was Mediterranean Climate Zone in 2005. The locations of trials formed at

Corresponding Author: Aydın Unay, Department of Crop Sciences, Faculty of Agriculture, Adnan Menderes University, Aydin- Turkey

Table 1: Plant material in trial and their combination

Genotypes	Combination
N/SG 1001-119	(Nazilli 84S/SG 1001)
N/D-121	(Nazilli 84S/DP 5614)
N/D 101	(Nazilli 84S/DP 5614)
NMS 39/11	(Nazilli M-503/Sicala 33)
MSI 30/71	(Nazilli M-342/Sicala 33)
NGC	(Nazilli84 // GW8751/Chirpan 603)
M25G	(M.764/25/GW8751)
NCCH8/1	(Nazilli 143/Chirpan 603)
NCCH 9/2	(Nazilli 143/Chirpan 603)
NMCH11/4	(Nazilli 143/Chirpan 603)
AHİZKA NO:10 GHMZ	Introduction Material (Uzbekistan)
AHIZKA NO:11 GHMD	Introduction Material (Uzbekistan)
AHIZKA NO:26 GHST	Introduction Material (Uzbekistan)
VIKY (ES-20021)	Introduction Material (Spain)
AFRICA (ES20025)	Introduction Material (Spain)
ERKENCI ADU 1	Introduction Material (A.D.U Agr. Fac)
ERKENCI ADU 2	Introduction Material (A.D.U Agr. Fac)
Nazilli 84 S	Standard Cultivar
Ozbek 142 S	Standard Cultivar
Carmen	Standard Cultivar

field of Nazilli Cotton Research Institute (Aydin), Soke (Aydin) and Saraykoy (Denizli), respectively. The experiments were arranged as a randomized complete block design with four replications, plots were 12 m length and consisted of four each row. The plots were thinned to a within-row plant spacing of 0.2 m and the density was 71420 plant ha^{-1}. The harvested area was 28 m^2.

The sowing dates of Nazilli, Soke and Saraykoy locations were 06.04.2005, 29.04.2005 and 05.04.2005, respectively. These locations were harvested 26.09.2005, 23.09.2005 and 10.10.2005, respectively. All experiments in Nazilli, Soke and Saraykoy received 500 kg ha^{-1} of 20-20-0 as pre-planting fertilizer, 130 kg ha^{-1} of urea (46-0-0) as pre-flowering fertilizer. All cultural practices (irrigation and plant protection) were conducted on commercial cotton farming operations across the region. The lint yield (kg ha^{-1}) values of all genotypes were determined as sum of first and second hand-harvest from each plot. Other observed characters were fiber percentage (%) and first picking percentage (%) and fiber properties such as fiber length (mm), fiber fineness (mic.) and fiber strength (g tex^{-1}) for each sample were determined using High Volume Instruments (HVI) in the Fiber Quality Laboratory at Nazilli Cotton Research Institute.

Variance analysis and Fisher's LSD mean separation tests at 0.05 probability level were performed by using the JUMP program.

RESULTS AND DISCUSSION

Results from the analysis of variance for observed characters were presented in Table 2. The differences among genotypes and locations were found significant for all characters while the location × genotype interactions were significant for all characters except fiber length and fiber strength. Therefore the location data were given separately.

The mean values of observed characters for Nazilli location were given in Table 3. The values of lint percentage were ranged from 45.2% (Ozbek 142 S) to 36.2 % (Ahizka11). Genotypes, N/D-121 (42.3%), Nazilli 84 S (42.9%), NGC (42.7%) and M25G (42.6%) showed an intermediated lint percentage. Data analysis showed that NCCH 9/2 (96.8%) gave significantly the highest first picking percentage. Ahizka26 (95.6%) followed NCCH 9/2, while N/D-121 had the lowest earliness. Table 3 showed that it was obtained that N/D-121 gave significantly the highest lint yield for Nazilli locations and Ahizka10 the lowest lint yield. N/D 101 genotype (29.55 mm) was the highest fiber length in Nazilli location while Ahizka26 (25.87 mm) had significantly the lowest value for fiber length. M25G (4.22 mic) and NCCH 9/2 (4.35 mic) gave significantly lower fiber fineness than the NMS 39/11 (5.19 mic) and VIKY (ES-20021) (5.25 mic) genotypes which had the highest fiber fineness. Fiber strength was superior for Carmen genotype (34.90 g tex^{-1}) but NMCH 11/4 (27.55 g tex^{-1}) had the lowest value among the other genotypes.

The mean observed values of all characters for Soke location were given in Table 4. Data analysis resulting showed that Ozbek 142 S (45.6%) gave significantly the highest lint percentage. The values of lint percentage were ranged from 45.6% (Ozbek 142 S) to 39.0% (NMCH 11/4). Although NMCH 11/4 genotype (1086 kg ha^{-1}) had the lowest lint yield, Ozbek 142 S (1811 kg ha^{-1}) had the highest value among all genotypes. A.F(ES20025) (1760 kg ha^{-1}) and VIKY (ES-20021) (1707 kg ha^{-1}) genotypes had the highest lint yield after the Ozbek 142 S genotype, respectively. From the Table 3, it was obtained that NCCH 9/2 (96.8%) gave significantly the highest first picking percentage while VIKY (ES-20021) (59.5%) genotype had the lowest value. NCCH8/1 (26.04 mm) had significantly the lowest value for fiber length but NGC (28.68 mm) had the highest value. NMCH11/4 (3.83 mic) and NGC (3.83 mic) gave significantly lower fiber fineness than the Ozbek 142 S 142 (4.83 mic) genotype which had the highest fiber fineness. The values of fiber strength were ranged from 35.45 g tex^{-1} (Carmen) to 29.18 g tex^{-1} (NCCH8/1) and 29.23 g tex^{-1} (NMCH11/4), respectively.

The mean values of all determined characters for Saraykoy location were given in Table 5. The values of lint percentage were ranged from 43.5% (Ozbek 142 S) to 34.7% (Ahizka 11). Genotypes, M25G (41.5%), N/D-121 (41.5%), Nazilli 84 S (41.6%) and A.F (ES20025) (41.3%) showed an intermediated lint percentage. Data analysis

Table 2: Variance analysis of observed characters

		Mean squares					
Source of variance	DF	Lint yield	Lint percentage	First picking percentage	Fiber length	Fiber fineness	Fiber strength
Block	8	63770.5*	30.4*	1052.86*	26.34*	2.12*	38.94*
Location	2	49499.1*	154.1*	2264.12*	31.01*	81.86*	108.16*
Genotype	19	93821.7*	872.7*	4460.54*	169.89*	14.83*	602.80*
Location×genotype	38	30555.9*	58.6*	3403.05*	27.77	3.21*	56.66
Error	152	59667.9	94.0	3903.36	91.74	5.78	232.14
Total	219	292117.7	1240.1	15652.95	346.36	108.40	1053.40

*,significant at probability level 0.05

Table 3: The mean values of observed characters for Nazilli location

Genotype	Lint percentage	First picking percentage	Lint yield (kg ha^{-1})	Fiber length (mm)	Fiber fineness (mic.)	Fiber strength (g tex^{-1})
N/D-121	42.3bc	72.9l	2112a	29.12ab	4.82c	33.88ab
N/D 101	41.6cd	83.3fh	1991ab	29.55a	4.87bc	32.63bc
NMS 39/11	40.4f h	79.3hI	1899bd	28.71ac	5.19a	32.50bc
Nazilli 84 S (S)	42.9b	85.3eg	1987ab	27.52dg	5.10ab	30.48df
AF. (ES20025)	41.1df	77.9Ik	1902bd	27.86ce	4.85bc	33.65ab
MSI 30/71	40.4fh	74.5kl	1823ce	28.09cd	4.62cf	31.45cd
VIKY (ES-20021)	39.9h	78.9I	1793cf	27.07eh	5.25a	30.50de
NCCH8/1	40.7eh	88.3ce	1781df	26.27hI	4.80c	28.85fh
Carmen (S)	41.3de	78.8Ij	1798cf	29.18ab	4.79c	34.90a
N/SG 1001-119	40.8dg	81.3gI	1777df	28.28bd	4.64ce	31.53cd
ERKENCI ADU 2	39.8hI	84.4eg	1679fh	26.93eh	4.53dg	30.25df
Ozbek 142 S	45.6a	88.0de	1912bc	26.74gI	5.28a	29.55eg
NGC	42.7b	82.9fh	1749eg	28.24bd	4.71cd	31.55cd
ERKENCI ADU 1	40.1gh	92.0bc	1625gh	26.70gI	4.80c	29.45eg
NMCH11/4	38.7j	90.6d	1552hI	28.33bd	4.42eh	27.55h
NCCH 9/2	39.0Ij	96.8a	1560hI	26.61gI	4.35gh	30.08df
M25G	42.6b	74.9jl	1691fg	27.75df	4.22h	32.50bc
AHIZKA 11 GHMD	36.2k	85.3ef	1384j	26.88fh	4.38fh	30.18df
AHIZKA 26 GHST	38.7j	95.6ab	1443Ij	25.87I	4.52dg	28.23gh
AHIZKA 10 GHMZ	36.9k	85.8ef	1377j	26.35hI	4.48dh	30.45df
LSD	0.88	2.00	130.2	0.94	0.26	1.64

Mean followed by different letter (s) are significantly different from one another at p<0.05

Table 4: The mean values of observed characters for Soke location

Genotype	Lint percentage	Lint yield (kg ha^{-1})	First picking percentage	Fiber length (mm)	Fiber fineness (mic)	Fiber strength (g tex^{-1})
VIKY (ES-20021)	40.2fi	1707ac	59.5j	27.62ag	4.42cf	32.45ce
A.F(ES20025)	41.6de	1760ab	64.8Ij	26.72fI	4.45ce	34.33ab
Carmen (S)	42.1d	1646ae	74.7dh	28.09ac	4.32dh	35.45a
Ozbek 142 S	46.8a	1811a	76.6ch	26.77eI	4.83a	30.50fI
N/SG 1001-119	41.7de	1566af	80.4af	27.76af	4.30dh	31.73cg
AHIZKA NO:26 GHST	38.6k	1439cg	81.7ae	26.82dI	4.14gj	29.93gı
Nazilli 84 S (S)	45.1b	1679ad	83.9ac	26.70f	4.54bd	31.15dh
NMS 39/11	41.2dg	1511af	73.1fi	27.32bh	4.74ab	31.93cf
AHIZKA11 GHMD	39.2hk	1429cg	81.8ad	26.86cI	4.01Ik	30.68eı
N/D-121	44.2bc	1617ae	71.9gı	28.06ad	4.42cf	32.53be
ERKENCI ADU 1	41.4df	1463bg	82.6ad	26.94cI	4.22eı	30.33fi
AHIZKA 10 GHMZ	39.0ik	1369eh	79.1ag	26.30hI	4.08hk	30.25fi
N/D 101	43.7c	1529af	73.4eh	28.05ad	4.66ac	31.95cf
NCCH8/1	42.2d	1471bf	78.6a	26.04ı	4.38dg	29.18ı
MSI 30/71	40.7eg	1376dh	69.8hı	28.00ae	4.38dg	32.93bd
ERKENCI ADU 2	40.4fh	1300fh	78.5a	26.50gI	3.95jl	29.53hı
NGC	44.2bc	1384dh	77.4h	28.68a	3.83kl	33.15bc
M25G	43.7c	1298fh	72.7fi	27.73ag	3.74l	32.88bd
NCCH 9/2	40.0gj	1162gh	86.0a	26.36hI	4.19fj	30.68eı
NMCH11/4	39.0jk	1086h	85.7ab	28.32ab	3.83kl	29.23ı
LSD	1.22	307.0	8.34	1.25	0.25	1.87

Mean followed by different letter (s) are significantly different from one another at p<0.05

resulting showed that N/D-121 (2006 kg ha^{-1}) had the highest lint yield. M25G (1836 kg ha^{-1}), A.F (ES20025) (1836 kg ha^{-1}), NMS 39/11(1597 kg ha^{-1}) and Nazilli 84 S (1710 kg ha^{-1}) had the highest value after N/D-121, respectively. (Table 5) showed that N/D 101 (91.1%) had the highest first picking percentage while NGC (71.2%)

Table 5: The mean values of observed characters for Saraykoy location

Genotype	Lint percentage	Lint yield (kg ha^{-1})	First picking percentage	Fiber length (mm)	Fiber fineness (mic)	Fiber strength (g tex^{-1})
N/D-121	41.5bc	2006a	83.9ad	29.35ac	3.33ad	34.47ab
M25G	42.1ab	1836ab	85.6ac	28.83be	2.91eh	34.30b
A.F (ES20025)	41.3bd	1735ac	83.2ad	28.19ch	3.53ac	34.60ab
NMS 39/11	38.9ef	1597ad	86.8ab	29.32ac	3.19cf	34.70ab
Nazilli 84 S (S)	41.6bc	1710ad	85.6ac	28.79bf	3.67a	33.30bd
MSI 30/71	39.0ef	1548be	85.3ac	28.73bf	3.13dg	33.70bc
Carmen (S)	40.6cd	1586ad	78.2be	28.92ad	3.28be	36.43a
N/D 101	40.9bd	1514be	91.1a	30.12a	3.37ad	34.30b
VIKY (ES-20021)	38.6ef	1398bg	75.9ce	28.44cf	3.22bf	31.47dg
N/SG 1001-119	38.9ef	1377cı	77.4be	28.20cg	3.37ad	33.00bd
ERKENCI ADU 1	38.9ef	1366cı	86.2ab	27.10gj	3.38ad	31.43dg
NCCH8/1	39.9de	1395bh	82.3ad	26.94hj	3.47ad	30.87eg
Ozbek 142 S	43.5a	1485bf	74.2de	27.56f j	3.60ab	32.83be
NGC	40.8bd	1277dj	71.2e	29.97ab	2.88fh	32.83be
NCCH 9/2	38.9ef	1104ej	86.5ab	27.62ej	3.24bf	32.27cf
AHIZKA11 GHMD	34.7h	944ı j	84.2ad	27.97dı	2.62h	32.83be
ERKENCI ADU 2	38.8ef	1043fj	77.8be	26.42j	3.10dg	30.30fg
NMCH 11/4	38.4f	1000gj	80.7be	28.44cf	3.11dg	30.13g
AHIZKA10 GHMZ	38.5ef	946hj	86.6ab	26.88ıj	2.91eh	30.77fg
AHIZKA26 GHST	36.7g	849j	81.9ad	26.73ıj	2.76gh	30.70fg
LSD	1.46	4491	10.30	1.26	0.39	2.01

Mean followed by different letter (s) are significantly different from one another at $p<0.05$

had the lowest value. The values of fiber length were ranged from 30.12 mm (N/D 101) to 26.42 mm (ERKENCI ADU 2). Nazilli 84 S and Ozbek 142 S had the highest fiber fineness than the other genotypes. Ahizka11 had the lowest fineness among the all genotypes in Saraykoy location. Carmen (36.43 g tex^{-1}), NMS 39/11 (34.70 g tex^{-1}), A.F (ES20025) (34.60 g tex^{-1}) and N/D-121 (34.47 g tex^{-1}) had the highest fiber strength, respectively.

In the conclusions, cultivar Ozbek 142 S for Soke and advanced line ND 121 for Nazilli and Saraykoy locations were the most productive ones, while the Ozbek 142 S genotype for lint percentage was also the highest value for all locations and ND 121 was considered in terms of first picking percentage. Bridge *et al.* (1971) revealed that the second most important contributor to lint yield is lint percentage. Lint percentage is highly and positively correlated with micronaire (Miller and Rawlings, 1967). It was seen that Ozbek 142 S 142 S had the highest micronaire, whereas ND 121 were intermediate micronaire group. Although Ahizka genotypes had poor fiber length and fiber strength, fiber properties of all genotypes were found at commercial limits. In Turkey, cotton purchased directly by Cooperatives is priced according to color and lint percentage on the basis of a scale developed by the cooperatives. Therefore, Ozbek 142 S may evaluate as superior cultivar by cotton grower and cooperatives.

REFERENCES

Anonymous, 2005. Cotton Agriculture. TARIS. Publ. Res. Develop. Depart. Bornova- Izmir, Turkey.

Bridge, R.R., W.R. Meredidh and J.F. Jr. Chism, 1971. Comparative performance of absolute and current varieties of upland cotton. Crop. Sci., 11: 29-32.

Eksi, I., S.N. Ozbek and H.B. Karadayı, 2000. Yield performance of some advanced breeding lines of cotton (*Gossypium hirsutum* L.). The Inter-Regional Coop. Res. Network on Cotton. Adana, Turkey. pp: 91-94.

Gencer, O., 2000. Country report-Turkey. Situation and future prospects of cotton in Turkey. The Inter-Regi. Coop. Res. Network Cotton.Adana, Turkey. pp: 18-21.

Miller, P.A. and J.O. Rawlings, 1967. Selection for increased lint yield and correlated responses in upland cotton, *Gossypium hirsutum* L. Crop. Sci., 7: 637-640.

Ozudogru, T. and N. Cakaryıldırım, 2005. Cotton Situation and Outlook: 2005/2006. Agric. Econo. Res. Instit. Ankara, Turkey.

Soyler, *et al.*, 2000. The structure of the control and certification of seed and registration of the cotton varieties in Turkey. The Inter-Regional Coop. Res. Network on Cotton. Adana, Turkey, pp: 67-72.