

## EFFECT OF PICKING DATES ON SEED GERMINATION, GIN TURN-OUT, SEED INDEX AND STAPLE LENGTH IN *GOSSYPIUM HIRSUTUM* L.

ZAHEER AHMED DEHO, S. LAGHARI, S.ABRO, M.A.ARAIN, M.HUSSAIN,  
S.A. ABRO AND FAKHRUDDIN

Plant Genetics Division Nuclear Institute of Agriculture (NIA)  
Tando jam, Pakistan.

### Abstract

The cotton seed germination is significantly affected in the humid agro-ecological zone of southern Sindh. Present investigations were carried out to determine the impact of different picking dates on traits like seed germination percentage, lint ratio, staple length (mm) and seed indices under fluctuating levels of temperature and humidity. Results of different picking dates revealed that seed cotton picked on dates i.e., 22/09 and 06/10 had high germination percentages of 90.93 and 94.23, respectively than those seed cotton picked on 15/09, 13/10 and 20/10. Seed indices (g) values i.e., 8.06g, 7.85g, and 8.01g, 7.85g obtained during 1<sup>st</sup> and 2<sup>nd</sup> differed significantly from the seed indices values i.e., 5.27-5.7g, obtained from picking dates of 06/10, (5.29-5.43g) during picking on 13/10 and 5.20-5.4g for seed cotton picked on 20/10. The staple length (mm) and gin turn out percentage values showed variety wise higher and lower plasticity in all picking dates.

### Introduction

Picking time in cotton is very important phase and affects the quality of lint. Usually cotton picking is practiced by the grower thrice during whole cotton growing period. Due to inclement weather condition of Hyderabad, lower Sindh and fluctuations in minimum and maximum temperature and relatively higher humidity levels (more than 65%) there is a deterioration in the quality and viability of seed. It effects of mixing of immature bolls along with mature ones during picking of seed cotton on the quality of the lint and the germination of the seed has been accentuated by Soomro *et al.*, (2004). The effects of different picking treatments intervals in minimizing the effect of low temperature, excess air moisture and effects of delayed picking in deteriorating the fiber quality traits i.e., fiber length and strength delayed pickings was reported in earlier findings of Chaudhry *et al.*, (1987). Soomro *et al.*, (2004) reported higher values of staple length, fiber maturity and strength as result of frequent pickings intervals with 15 days obtained in early picking treatments. Khan (1981) reported highest values for fibre fineness and fibre maturity in his findings obtained at the second pick in variety delta pine smooth leaf and AC-134. Varietal response leading to inferior seed quality, with moderately high values for seed and kernel index and low seed index/kernel index ratios; even at their late pickings was reported by Moholkar & Thombre (1987) in their findings. The fortnightly intervals effects on cotton picked in mid-August until mid-November, highest deteriorating effects on production of quality cotton picked in later pickings in September was reported by Nagwekar *et al.*, (1983). Keeping in view, the present study was designed to determine the impact of weekly picking intervals on the seed maturity and viability of cotton seed.

### Material and Methods

Two year study on picking dates with six weekly intervals was conducted. Five candidate/released varieties i.e., NIA-79, Sadori, NIA-Ufaq-2008, Chandi-95 and NIAB-78 were studied at Nuclear Institute of Agriculture (NIA) Tando jam. The experiment was grown on 20<sup>th</sup> April 2006 and 2007 with three replicates in randomized

complete block design having plot size of dimension 6.1 x 6.1m<sup>2</sup>. The seeds of 05 cotton varieties were planted having row to row distance of 75cm coupled with spacing between plants in finally thinning at 30cm. All the agronomical and plant protection measures were managed properly. Fifteen plants /variety/replication were tagged for six weekly picking treatments and another set of 15 selected plants / variety /replication for sole picking treatment to see the effect of picking intervals and a single (final) picking if the crop is exposed with opened bolls in the field. Two bulk samples of each treatment /variety/replication were ginned separately. Two years data were taken and analyzed statistically.

### Results and Discussion

Cotton crop from germination to maturity takes 150-160 days and is sensitive to weather conditions. Table 1 depicts the recorded meteorological data of Tando Jam and vicinity during kharif 2006 and 2007, showing average maximum temperature from May and June 38°C to 40°C, respectively. Averagely high relative humidity percentage (71-84%) was in the months of August and September of both years 2006-07 which badly affected seed maturity, seed germination percentage and increase ginning turn out percentage.

The mean square values for traits like ginning turn out, staple length (mm), seed index (g) and germination percentage show the highly significant differences between dates of picking in different years for traits like ginning turn out, staple length, and germination percentage among varieties evaluated under present studies. The data also illustrates the highly significant difference for seed index values against picking dates of seed cotton of varieties. The mean square values obtained for traits like GOT, staple length and germination percentage showed also highly significant differences among varieties evaluated under present investigations. The mean square values for interaction of varieties and picking dates showed significant differences for ginning turn out and germination percentages due to fluctuation of humidity and day night temperature during 2006 and 2007.

**Table 1. Average meteorological data of year 2006 & 2007.**

Months	Temperature				Relative humidity %	
	2006		2007		2006	2007
	Min °C	Max °C	Min °C	Max °C	RH%	RH%
May	21	38	21	40	62	65
June	26	39	26	38	67	73
July	26	39	27	36	67	76
Aug	27	37	25	36	75	79
Sep	25	34	24	37	84	71
Oct	21	35	17	36	74	60
Nov	15	31	14	33	69	67

The effect of different picking dates on traits like ginning turn out, staple length, seed index and germination percentage are given in Table 3. The sole picking date 20/10 in all varieties were not highly significant than the other picking dates. The effect of temperature and humidity had badly affected the cotton seed due to continuous high humidity effect from August to October. Due to dew/ humidity seed opened the micropyle and water entered into micropyle and wakeup the plumule. High humidity causes the attack of fungus on cotton seed which reduce the viability of seed, loses the weight of seed finally turns it to dead. As the cotton seed lost weight automatically lint percentage is increased as sole picking date 20/10 (Table 3). Other reason of this increase the ginning out turn percentage as temperature falls down and it automatically affected the growth and maturity of cotton seed. The late picking would lose seed weight because of dead or immature cotton seed of all varieties in picking 20/10. These results are in accordance with the earlier findings of Chaudhry *et al.*, (1993); Salam *et al.*, (1993) and Abass *et al.*, (2010).

The data presented in Table 3 reveals the effects of different picking dates increase and decrease of staple length (mm) due plasticity of temperature and humidity (Table 1). The affect of weather in deterioration of staple length trait has also been reported by Basinski *et al.*, (1973). Who reported that the fiber length (mm) was reduced markedly by weather consistently on average 0.7% per week of exposure. The present findings that how

environment significantly influenced the fiber traits are in accordance with the results of Quensenberry & Kohel (1975 who also reported the similar kind of effect on fiber length (mm) and strength due to delayed picking.

The differences among different pickings were highly significant (Table 2). The values for seed index (g) obtained on different picking dates 15/09, 22/09 and 29/09 were highly significant among all varieties evaluated. During the months of September and October, the day night temperature fluctuated and the moisture was absorbed by cotton seed due to high humidity during the months of August, September and October (Table 1). The cotton seeds absorb the moisture through seed micropyle and the seed plumule awake up and seed are badly affected then lose its weight and size. The reason for low values of seed index (g) at the 4<sup>th</sup>, 5<sup>th</sup> and sole picking dates is due to development of small seed sized and dead cotton seed. Therefore the cotton seed gave lowest germination percentage in our site areas nearest coastal areas where is high humidity and day night fluctuated temperature. The present result are in accordance with the results of Zakaria *et al.*, (2007) and Rafique (2006) who also reported that cottonseed quality is affected to a great extent by the indeterminate growth habit of a cotton plant. Seed vigor and viability the important components influencing seedling establishment, crop growth, and productivity were adversely affected due to high humidity and day night fluctuated temperature.

**Table 2. Mean squares for ginning out turn percentage, staple length (mm), seed index (g) and germination percentage.**

Source of variance	d.f.	G.O.T %	Staple length (mm)	Seed index (g)	Germination %
Replication	2	0.71	0.62	0.128	1.56
Year (A)	1	0.55	14.85**	1.14 NS	0.05 NS
Dates (B)	5	30.69**	0.91**	40.60**	15494.50**
A x B	5	1.75**	1.99**	0.59 NS	9.90**
Varieties (C)	4	18.23**	12.99**	0.12 NS	13.04**
A x C	4	0.99*	0.99**	0.12 NS	2.8 NS
B x C	20	0.94**	0.44 NS	0.24 NS	11.47**
A x B x C	20	0.39	0.25	0.18 NS	1.50 NS
Error	118	0.20	0.17	0.17	1.23

\*\* - denotes highly significant; \* - denotes significant; NS – non significant

**Table 3. Effect of different picking dates on ginning turn out percentage of different genotypes of cotton\*.**

Genotypes	1 <sup>st</sup> pick 15-09	2 <sup>nd</sup> pick 22-09	3 <sup>rd</sup> pick 29-09	4 <sup>th</sup> pick 6-10	5 <sup>th</sup> pick 13-10	Sole pick 20-10
<b>Ginning turn out values (%)</b>						
NIA-79	34.42k	34.61jk	35.99ef	36.36cde	36.94ab	37.32a
Sadori	34.47jk	35.18hi	36.36cde	37.33a	36.61bcd	37.01ab
NIA-Ufaq-2008	34.08k	34.12k	35.34ghi	36.14def	35.67fgh	36.33cde
Chandi-95	34.05k	34.35k	35.00ij	34.99ij	35.92ef	36.86abc
NIAB-78	33.39i	33.28i	34.33k	35.21hi	34.03k	35.85efg
<b>Staple length (mm)</b>						
NIA-79	27.60hij	27.62hij	27.63hij	27.50jkl	27.78ghi	28.03fgh
Sadori	27.50jkl	28.27cde	28.12def	28.52bcd	27.85ghi	28.07efg
NIA-Ufaq-2008	28.25cde	28.73abc	28.82ab	28.90ab	28.60abc	28.20cde
Chandi-95	28.15def	29.10a	28.65abc	29.05ab	28.25cde	28.73abc
NIAB-78	27.42klm	27.07no	27.55ijk	27.27lmn	27.08mno	27.02 o
<b>Seed index values(g)</b>						
NIA-79	7.85a	8.01a	6.68d	5.36e	5.28e	5.28e
Sadori	7.28bc	7.61ab	6.66d	5.70e	5.42e	5.42e
NIA-Ufaq-2008	8.06a	7.73ab	6.61d	5.48e	5.43e	5.32e
Chandi-95	7.26bc	7.85a	6.56d	5.40e	5.40e	5.32e
NIAB-78	7.76ab	7.80a	7.03cd	5.26e	5.39e	5.20e
<b>Germination percentage</b>						
NIA-79	44.10lm	90.93b	81.30f	77.73gh	57.77i	37.57n
Sadori	44.07lm	92.27b	85.40d	77.93gh	56.33j	35.07o
NIA-Ufaq-2008	43.27m	93.60a	85.57d	77.37h	57.43ij	37.40n
Chandi-95	44.90kl	94.23a	82.77e	77.93gh	57.27ij	36.07o
NIAB-78	45.53k	91.57b	87.67c	79.07g	56.33j	38.63n

\*Pooled values for ginning turn out percentage, staple length, seed index and germination percentage for the years 2006 & 2007

The mean square values for the traits of germination percentage revealed highly significant against different picking dates among varieties (Table 2). The results of germination percentage of all varieties showed that the picking dates 22/9 (90.93% - 94.23%), 29/09 (81.30%-87.67%) and 06/10 (77.37% - 79.07%) highest germination percentage than the 15/09, 13/10 and 20/10 respectively as given in Table -3. It has been noted that the temperature of August and September remained favorable (36°C-37°C) but the humidity (79% and 71%) was not suitable for cotton seed. Due to fall in temperature in September and October and continuous high humidity from August, September and October the germination was also imperfectly affected. After the 2<sup>nd</sup> picking to onward each picking date and every variety showed a decline trend of germination % age showed downward trend because of the continuously decrease in day night temperature during both years in months of September and October while the high humidity also helped to affect cotton seed respectively during these months (Table 1).

#### References

- Abass, G., G. Hassan, M. Aslam, I. Hussain, U. Saeed, Z. Abbas and K. Ullah. 2010. Cotton response to multiple application of growth inhibitor (mepiquat chloride). *Pak. J. Agri. Sci.*, 47: 195-199.
- Basinski, J.J., G. Robinson and N.J. Thomson. 1973. Cotton varieties and related studies. *Cot. Grow. Rev.*, 50(3):193.
- Chaudhry, A.S., M. Arshad and M. Afzal. 1993. Effect of picking dates on ginning out turn, seed index and lint indices of four commercial cotton varieties of *G. hirsutum* L. *The Pakistan Cottons*, 37(02): 77.
- Chaudhry, M.R., A. Salam and M.A. Tariq. 1987. Effect of picking intervals on some fiber characters of cotton. *The Pakistan Cotton*, 31(1): 47-54.
- Khan, Z.R. 1981. Cotton quality in relation to the dates of picking. *Pakistan Cottons*, 25(3):181-190.
- Moholkar, N.D. and M.V. Thombre. 1987. Effect of picking sequences on seed and kernel index in *G. hirsutum* L., cotton. Current research reporter. *Mahatma Phule Agricultural University*, 2(1): 40-44.
- Nagwekar, S.N. Kairon and M.S. Vireshwar Singh. 1983. Effect of picking time and interval on the quality of cotton. *Cotton Development*, 13(2): 5-8.
- Quensenberry, J.E. and R.J. Kohel. 1975. Growth and development of fiber and seed in upland cotton. *Crop. Sci.*, 15(04): 463.
- Rafique, M., Chaudhry and Andrei Guitcounts. 2006. The cotton plant and its organs. Cotton Facts. *International Cotton Advisory Committee*, pp. 09.
- Salam, A., M Arshad and M.Afzal. 1993. Effect of picking dates on fiber characters of different commercial cotton varieties of *G. hirsutum* L. *The Pakistan Cottons*, 37(2): 67-74.
- Soomro, A.R., Noor-Illah, Zahid Mahmood and Kifayatullah Khan. 2004. How picking dates affect ginning turn and fiber characteristics in cotton. Central Cotton Research Institute, Multan, Pakistan. *Indus Cottons*, 1(2): 29-34.
- Zakaria, M. Sawan, Ashraf. H. Fahmy and Serag. E. Yousuf. 2007. Cotton seed yield, seed viability and seedling vigor as affected by nitrogen, potassium, phosphorus, zinc and plant growth retardant. *The African Journal of Plant Science and Biotechnology*, 1(1): 16-25.