

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

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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 1st and 2nd 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 20th April 2006 and 2007 with three replicates in randomized

complete block design having plot size of dimension 6.1 x 6.1m². 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 4th, 5th 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 | 1st pick 15-09 | 2 nd pick 22-09 | 3 rd pick 29-09 | 4 th pick 6-10 | 5 th pick 13-10 | Sole pick 20-10 |
|------------------------------------|-------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|--------------------|
| Ginning turn out values (%) | | | | | | |
| 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 |
| Staple length (mm) | | | | | | |
| 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 |
| Seed index values(g) | | | | | | |
| 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 |
| Germination percentage | | | | | | |
| 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 2nd 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).

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