

NOTE

Seed Quality Deterioration of Cotton During Storage

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Cotton seeds of genetically different varieties of *Gossypium hirsutum* and *Gossypium arboreum* were collected and stored for two years under ambient conditions. At the time of storage the percentage of seed oil, starch, nitrogen, fatty acids and amino acids ($\mu\text{g g}^{-1}$) were determined. At the end of the storage period nitrogen content, starch and oil percentage decreased while the free fatty acids and amino acids increased.

The nitrogen contents and consequently the crude protein content decreased because of its hydrolysis, and hence the amino acids showed an increase in its contents. Free fatty acids increased due to the action of lipases on fats and due to this oil content decreased during the study. The decrease in starch was perhaps due to the activity of hydrolytic enzymes of starch with increasing moisture and temperature as well as storage period.

Crop productivity has increased with the rapid increase in the knowledge of agriculture and hence good inputs are essential to ensure good crop yields.

The knowledge of biochemistry of seed deterioration is still elementary. However, several changes are thought to be responsible for seed deterioration, viz., chromosomal and membrane damage¹ and damage to respiratory system^{2,3}, but the mechanism is not very clear.

Once the seed cotton has been harvested, it may be stored for a while before it is ginned. The conditions under which this storage occurs are major determinants of the desirability of this storage. In many ways the type of deterioration that may occur during storage of seed cotton is similar to that occurring in the period of adverse weather in the field prior to harvest. Consequently it is required to minimise the high temperature and moisture.

Sufficient quantity of each variety of cotton seed was collected and half of the cotton seed was acid delinted⁴ with concentrated sulphuric acid while the other half was kept as such (fuzzy). Both the delinted and fuzzy seed lots were treated with thiram (0.25%) and hand-cleaned, dried and only pure seed components were used. The initial observations were made and recorded for percentage of nitrogen, starch, oil, free fatty acids and free amino acids ($\mu\text{g g}^{-1}$). After the initial observations seed lots were packed in polythene bags and kept for two years under ambient conditions, and then the final observations were made.

Nitrogen content was estimated by conventional Microkjeldahl's method⁵. Starch and free amino acids were estimated by methods of Dubois *et al.*⁶ and

Yemn and Cocking⁷ respectively. Free fatty acids were estimated by Rao *et al.*⁸ where as seed oil was estimated by Gupta *et al.*⁹

The seed oil (%) decreased during the storage period. The decrease in oil (%) was found to be maximum in Frazzy-treated seed lots of RG-8 whereas in the lots of HS-6 and H-777 this decrease was almost the same. The results are in agreement with the results obtained by Stansbury and Guthrie¹⁰ who studied the effect of storage of cotton seed oil content. The works of Stansbury and Cucullu¹¹ and Turner *et al.*¹² are also in support of this work.

The decrease of starch (%) in seed lots of HS-6 and H-777 were almost the same whereas the decrease was maximum in the fuzzy and treated seed lots of RG-8. The lowest decrease was observed in the delinted-treated seed lot of H-777. Similar findings have been reported by Ching¹³ who observed reduction in starch with increasing moisture and temperature which was probably due to the activity of hydrolytic enzymes of starch and respiration of seeds.

TABLE-1
CONTENT OF NITROGEN, STARCH, FREE FATTY ACIDS, FREE AMINO ACIDS AND OIL
BEFORE AND AFTER STORAGE

| Varieties | Treatment | Parameters, Initial (Final) reducings (%) | | | | |
|-----------|-----------|---|------------------|----------------------|------------------|---|
| | | Nitrogen (%) | Starch (%) | Free fatty acids (%) | Oil (%) | Free amino acids ($\mu\text{g g}^{-1}$) |
| RG-8 | DT | 2.91 (1.91) | 18.00 (12.50) | 1.14 (1.96) | 21.53 (18.90) | 16.46 (17.60) |
| | FT | 2.80 (1.70) | 17.50 (11.00) | 1.20 (2.10) | 21.00 (16.50) | 16.60 (19.20) |
| H-874 | DT | 3.24 (2.40) | 16.40 (12.40) | 1.28 (2.00) | 23.60 (20.70) | 12.20 (14.00) |
| | FT | 3.10 (1.92) | 16.00 (11.00) | 1.40 (2.10) | 23.10 (19.40) | 12.50 (15.00) |
| HS-6 | DT | 2.80 (1.98) | 17.50 (13.00) | 1.30 (2.20) | 22.60 (18.20) | 12.03 (13.90) |
| | FT | 2.70 (1.72) | 17.00 (12.20) | 1.46 (2.40) | 21.80 (17.55) | 12.30 (14.00) |
| H-777 | DT | 3.25 (2.35) | 17.80 (14.20) | 1.10 (1.70) | 23.15 (19.50) | 13.75 (15.32) |
| | FT | 3.00 (1.981) | 17.20 (13.20) | 1.25 (1.95) | 22.04 (18.30) | 13.90 (15.90) |

DT = Delinted-treated; FT = Fuzzy-treated

Nitrogen content also showed a decrease during the study. Once again similar to starch nitrogen content of fuzzy-treated seed lot of RG-8 decreased maximum whereas this decrease in RG-8, HS-6 and H-777 was nearly same with a difference of 5 to 7%. The difference in percentage decrease of N content in the delinted-treated and fuzzy treated seed lots of H-974 was found to be nearly 12. The results

obtained are in agreement with the results obtained by Karon and Altschul¹⁴ and Stansbury and Guthrie¹⁰ who observed the protein content and temperature.

Free amino acid increased during the storage period as per the results obtained. The increase in free fatty acids in fuzzy-treated seed lots of H-974 was found to be maximum whereas it was minimum in the delinted-treated seed lots of RG-8.

The results obtained are similar to the results obtained by Zeleny and Coleman¹⁵ who observed increase in free amino acids in oilseeds, cereal and legume, respectively during storage at different temperatures. Ching and Schoolcraft¹⁶ also found increase in free amino acids in crimson clover and rye grass seeds during storage under different moisture contents and temperatures. Zeleny and Coleman¹⁵ reported that amino acid is produced by hydrolysis of proteins by protease in oilseeds.

The perusal of data indicated that the free fatty acid increased during the storage period in the delinted-treated seed lots of RG-8 whereas it was found to be minimum in the fuzzy-treated seed lots of H-974. The results are in agreement with the results obtained by Harris and Wamble¹⁷ and Harris¹⁸ who observed increase in the fatty acids in cotton seeds stored at high temperatures. The results obtained by Agrawal and Siddiqui¹⁹ are also similar.

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