Storage Experiments on Eucalyptus hybrid (mainly E. teraticornis)

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The results of laboratory scale experiments on effect of storage on pulping qualities of Eucalyptus hybrid (mainly E. tereticornis) are described. Both debarked logs and logs with bark were stored separately. The results indicate that 1% NaoH solubility increase with the time of storage period. The yield of pulp reduces and Kappa number is not affected to any significant extent. The strength properties viz., Breaking length, burst factor and tear factor of handsheets made from unbleached pulp falls.

Introduction

Large scale plantations of Eucalyptus hybrid (mainly E. tereticornis) have been raised in the country to meet the future requirement of pulp and paper. Several mills have already started using *E. hybrid* along with other raw-materials as a furnish. New mills are being planned using *E. hybrid* as short fibred component of the furnish. Most of the mills are storing the pulpwood in the form of debarked logs.

At the request of the U.P. Forest Department a series of laboratory scale pulping experiments were done on Eucalyptus hybrid stored with and without bark. The samples drawn from freshly felled logs, were stored for 6 months, 9 months and 12 months.

8 stacks of Eucalyptus hybrid each of 1 metre width, 2 metre length and 4 metre height were made at the Lalkua nursery during the month of December 1972. In 4 stacks debarked logs were kept, and in remaining 4 stacks logs with bark were kept. The logs were of about 10 cm diameter. The wood was sent to Dehra Dun at regular intervals by road transport. Wood when received at Dehra Dun was debarked (in the case of wood with bark) and chipped.

TABLE I

Chemical analysis of Stored Wood

Sl. No.	*Raw Material*	*Time of Storage months*	*1% NaOH Solubility %*	*Hot water Solubility %*
1	Wood without bark	0	12.5	4.6
2	Wood with bark	0	10.2	3.7
3	Wood without bark	6	14.5	5.5
4	Wood with bark	6	13.0	4.5
5	Wood without bark	9	17.8	5.7
6	Wood with bark	9	13.9	4.9
7	Wood without bark	12	19.6	6.0
8	Wood with bark	12	15.7	5.1

Chemical Analysis

The wood chips were made into duet and the material passing through 60 mesh and retained on 80 mesh was used for the determination of 1% NaoH solubility and hot water solubility—employing TAPPI standards. The results of the analysis are recorded in Table I.

Production of Pulp

The wood chips (2000g) were digested using sulphate process (NaoH : Na_2S=3:1) in a 3-litre vertical stationary autoclave using a material to liquor ratio of 1:4, total chemicals 16%, maximum temperature 162°C and cooking period of 4 hours. After digestion, the pulps were washed and the yield and Kappa number were determined. The pulps were beaten in Lampen Mill to a freeness of about 250 ml C.S.F. and standard sheets of about 60 g.s.m. were made. The sheets were pressed and dried in air using rings and plates. The dry sheets were conditioned at 65% R.H. and 27°C temperature and tested for strength properties. The results are recorded in Table II.

Discussion

It could be seen from Fig. 1. that with the increase in storage time 1% NaoH solubility increases. This indicates that some decay is taking place during storage. When comparing 1% NaoH solubility of logs with bark and without bark, it could be observed that the increase in solubility is same upto the storage time of 6 months, after which the increase in solubility is more in case of logs stored without bark. Initial slight difference in 1% NaoH solubility between logs stored with bark and without bark could perhaps to be due to variation within, with species, experimental error and/or due to some decay in case of logs without bark due to time logs between debarking operation and the experiment conducted. In case of wood with bark, however, it is expected that the decay during falling of tree and experiment conducted will be less as compared to debarked wood. Hot-water solubility was not effected to any appreciable extent.

Fig. 2. indicates that pulp yield drops with storage. The loss in yield increase with increased storage time. Higher loss in yield is observed in case of logs stored without bark as compared to with bark. The kappa number of pulp shows a trend of increase with increased storage and again increase in kappa number is more in case of debarked logs as compared to logs with bark. However the increase in both the cases is not significant.

TABLE II

Sl. No.	Raw Material	Unbleached Screened Pulp yield %	Kappa No.	Breaking length m.	Burst factor	Tear factor
1	Wood without bark	49.8	27.9	8010	48.3	84.2
2	Wood with bark	51.0	26.8	8320	50.3	87.2
3	Wood without bark	48.7	28.9	7830	46.6	78.7
4	Wood with bark	49.8	27.4	8130	40.6	84.6
5	Wood without bark	44.8	31.3	6720	44.2	76.3
6	Wood with bark	46.9	29.5	7510	46.0	80.3
7	Wood without bark	40.5	31.7	4690	39.7	70.6
8	Wood with bark	44.7	29.8	6990		76.5

Fig. 3. indicates that the properties of pulps are adversly effected during storage. The strength properties viz., breaking length, burst factor and tear factor falls when the logs are stored. The loss in strength properties are more in case of logs stored without bark when compared to with bark.

It could be observed that all the properties fall with storage. Maximum deterioration took place when the logs were stored for 12 months. The fresh samples and the samples stored for 12 months were examined by Pathology Branch of Forest Research Institute. Their findings indicated that fresh samples were unattacked by fungus but all samples stored for 12 months manifested attack by staining fungi, soft rot fungi and also decay by *Senizophyllum Commune*. The deterioration, however did not go very deep and was generally confined to the surface.

Conclusion

1. Under the conditions studied it could be seen that 1% NaoH solubility increases with increased storage time. Debarked wood when stored shows greater loss when compared to wood with bark.

2. The pulp yield reduces with storage time. The trend is same as in the case of 1% NaoH solubility, 1% NaoH solubility, thus gives a good indication of the condition of wood.

3. The strength properties of pulp viz., Breaking length, Burst factor and tear factor reduces on storage. With the increased storage the losses are more.

4. In view of above, it is advisable to have as short period of storage of Eucalyptus hybrid as possible. Possibility of use of preservatives could, perhaps be useful to avoid decay.

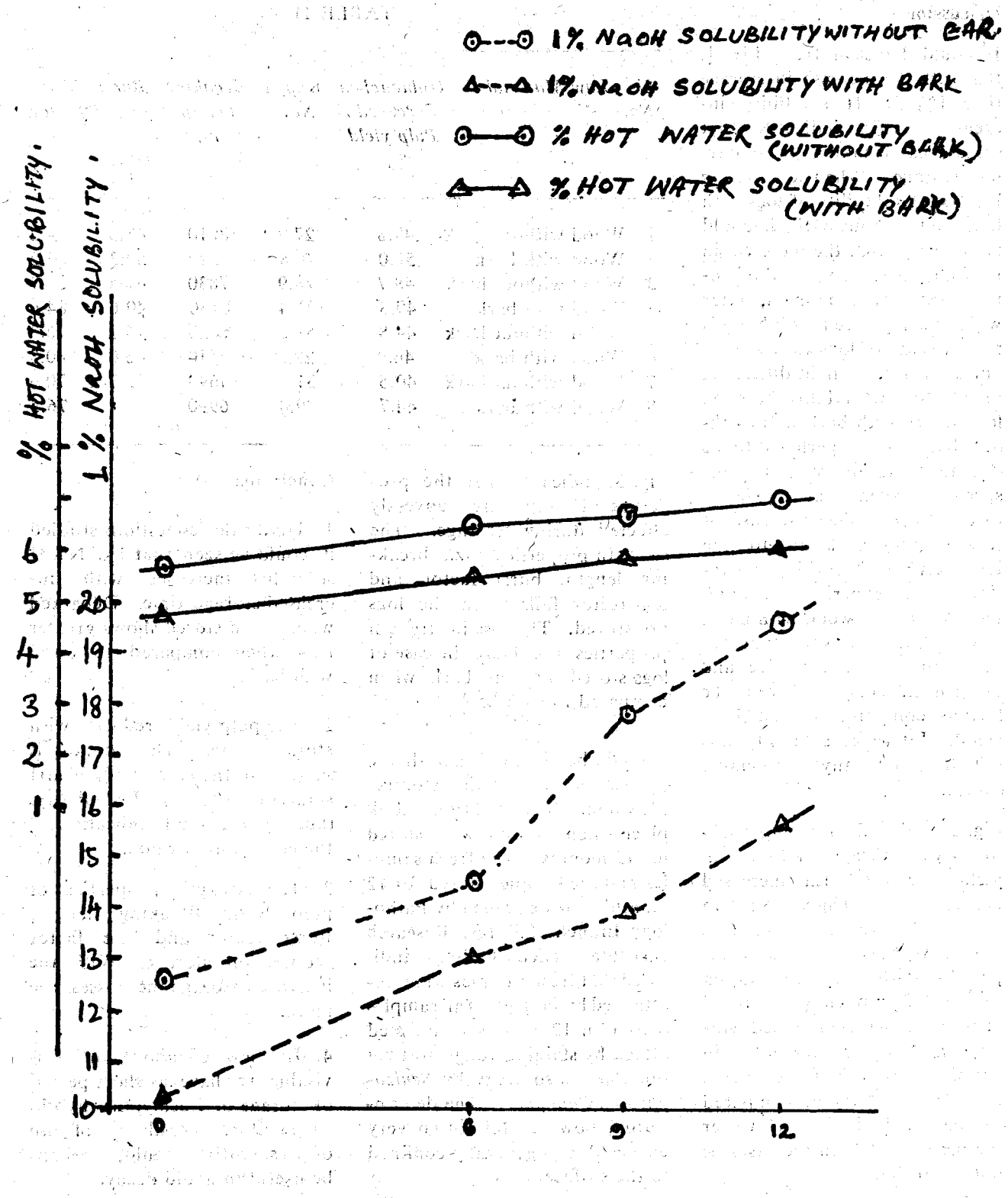

FIG. 1 EFFECT OF STORAGE ON 1% NaOH SOLUBILITY AND HOT WATER SOLUBILITY.

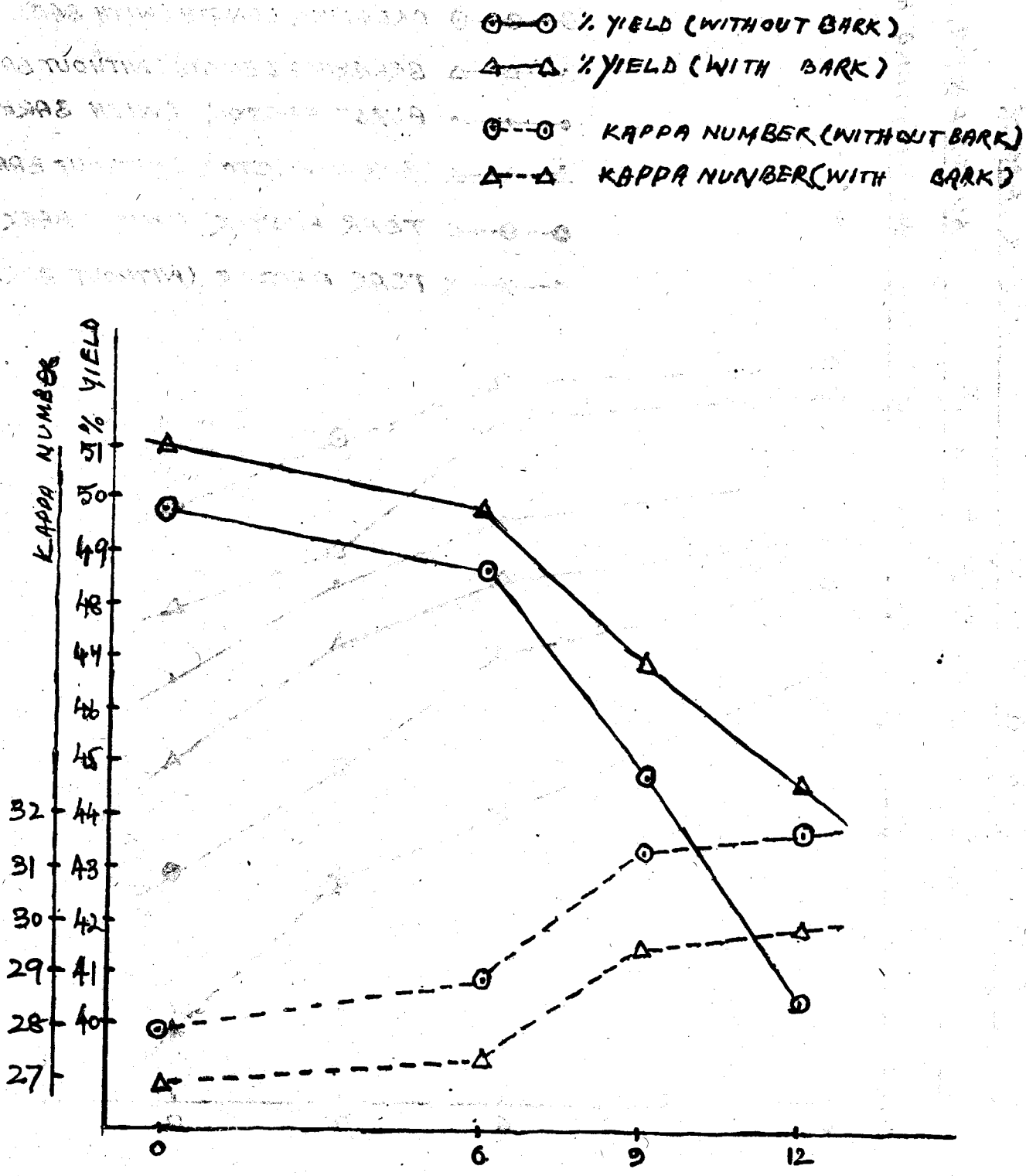

FIG 2. EFFECT OF STORAGE ON YIELD AND KAPPA NUMBER OF PULP

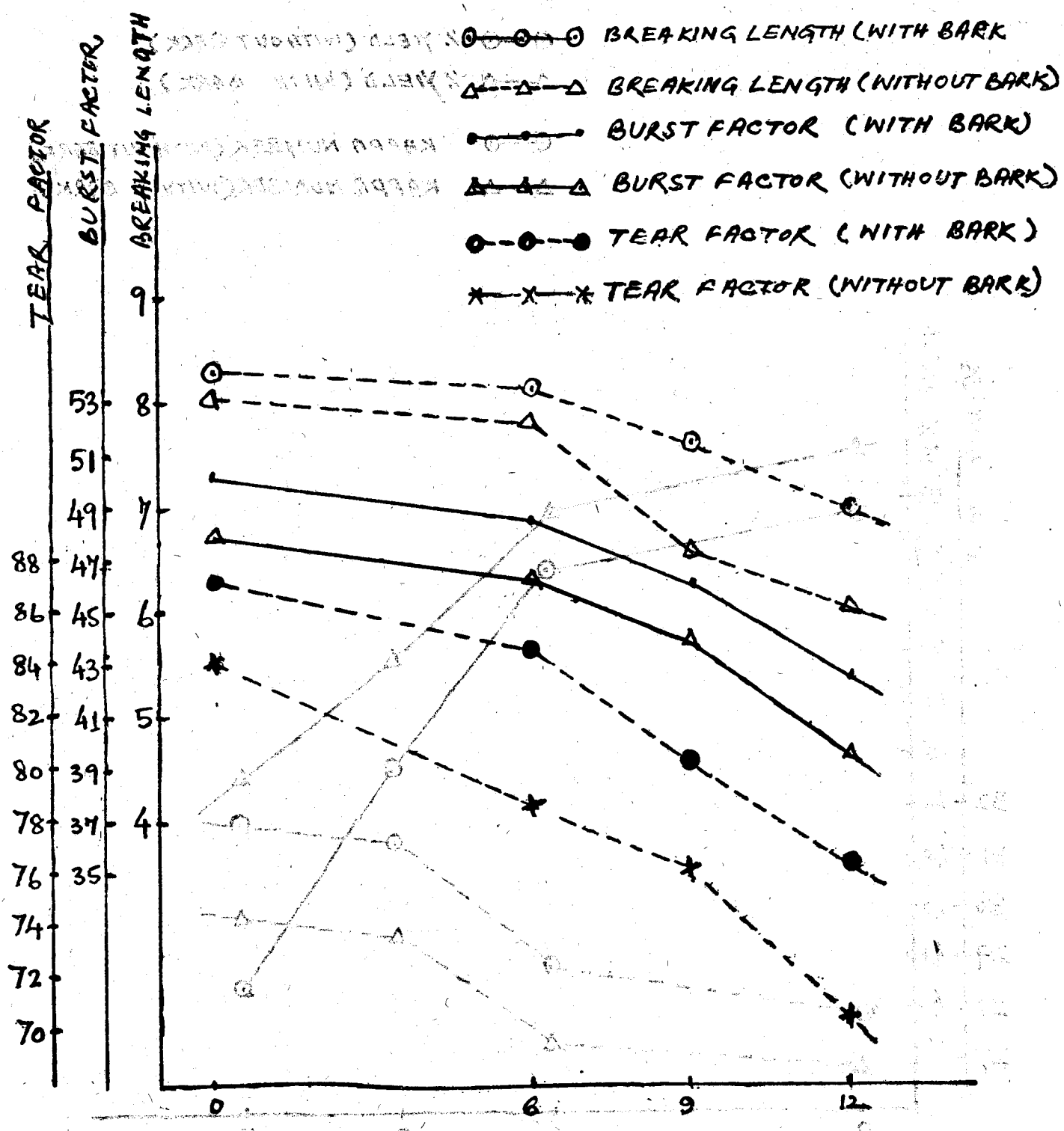

FIG. 3. EFFECT OF STORAGE ON STRENGTH PROPERTIES OF HAND SHEETS.