

## EFFECT OF LIGNIN ACETIC ACID IN THE ROT PROOFING OF COTTON YARNS AND JUTE FIBRES

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The fungicidal properties of lignin acetic acid have previously<sup>1</sup> been studied against several fungi including *Memnoniella echinata*, and therefore in the present study an attempt has been made to find out whether lignin acetic acid could be used as rot proofing agent against fungal deterioration of cotton yarns and jute fibres. *Memnoniella echinata* and *Chaetomium globosum* were respectively selected as cellulolytic organisms for cotton yarns and jute fibres as they were found in the previous experiment<sup>2</sup> by the present authors to cause greater degradation of the strengths of yarns and fibres. The action of lignin acetic acid as a protectant was determined by growing the organisms on lignin acetic acid treated and untreated cotton yarns and jute fibres, and then testing their breaking strength.

### Materials and Methods

In the earlier work on the use of lignin acetic acid as a fungicide,<sup>1</sup> a 1% solution had been found to check the growth for a period of 9 days, following which a slight growth was recorded. Therefore a slightly higher concentration, *viz.* 2% lignin acetic acid solution was used in the present study, and was prepared by dissolving 2 g. of the chemical in 5 ml. ethyl alcohol<sup>1</sup> and then mixing in 95 ml. water. The cotton threads and the jute fibres were placed on the microscope slides, tied at both ends<sup>2</sup> and then dipped in the above

solution for 30 minutes. The excess solution was drained off and the material was allowed to dry. The slides with threads thus treated were placed in a raised condition on two pieces of glass rods within petri dishes containing 2 Whatman No. 4 filter papers. These were then autoclaved at 15 lbs. pressure for 15 minutes. To each dish 3 ml. sterilised water was added by means of sterilised pipettes. In the experiment both lignin acetic acid treated and untreated controls were kept along with the inoculated sets of treated and untreated sets for comparison. Inoculation was done by dusting the respective sets with spores of the organisms, *M. echinata* and *Ch. globosum*. All the sets were incubated at room temperature inside a glass chamber having theoretically 100% humidity.

Samples of cotton yarns and jute fibres were examined and tested for the breaking strength three times during the six weeks incubation period, i. e. every two weeks. Each time the yarns and fibres were removed from the petri dishes and carefully rinsed in 70% ethanol to remove the fungal growth, after which they were washed in distilled water, the excess of water drained off and the fibre allowed to dry on filter paper. The air dried yarns and fibres were conditioned at 65% relative humidity for 24 hours before measuring the breaking strength of the fibres.

TABLE I.—COMPARATIVE CELLULOLYTIC ACTIVITY OF *M. echinata* ON TREATED AND UNTREATED COTTON YARNS AT THREE INTERVALS OF TIME.

(L.A.A.=Lignin acetic acid)

Time elapsed	Mean breaking weight from ten measurements (in g.)			
	Control sets		Inoculated sets	
	Untreated yarns	L.A.A. treated yarns	Untreated yarns	L.A.A. treated yarns
Second week	279.3	276.0	100.4	129.0
Fourth "	273.2	267.8	80.7	94.7
Sixth "	264.3	261.1	48.7	79.4

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TABLE 2.—COMPARATIVE CELLULOLYTIC ACTIVITY OF *Ch. globosum* ON TREATED AND UNTREATED JUTE FIBRES AT THREE INTERVALS OF TIME.

Time elapsed	Mean breaking weight from ten measurements (in g.)			
	Control sets		Inoculated sets	
	Untreated fibres	L.A.A. treated fibres	Untreated fibres	L.A.A. treated fibres
Second week	41.2	40.9	22.0	35.5
Fourth „	40.1	39.4	12.5	29.5
Sixth „	39.0	37.1	6.5	19.1

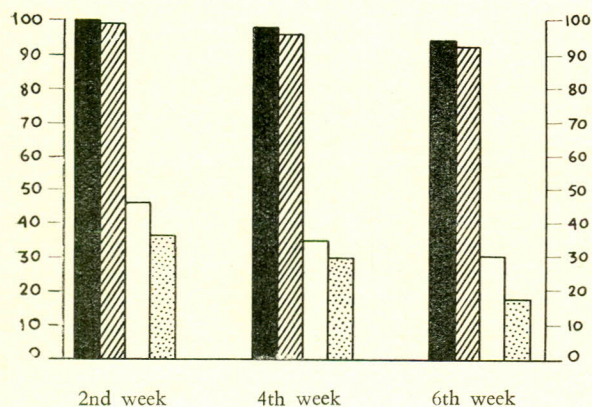
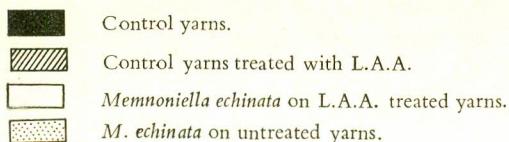


Fig. 1.—Percentage of strength of variously treated cotton yarns after three successive periods.



### Results

After the second, fourth and sixth week of incubation, the fibres were tested for their breaking strength, the individual fibre and yarn being clamped one by one to the measuring pan of the balance<sup>2</sup> and the breaking load determined. Table 1 shows the results obtained with cotton yarns against *M. echinata*. Results obtained with jute fibres against *Ch. globosum* are shown in Table 2.

Data presented in Table 1 showed that with

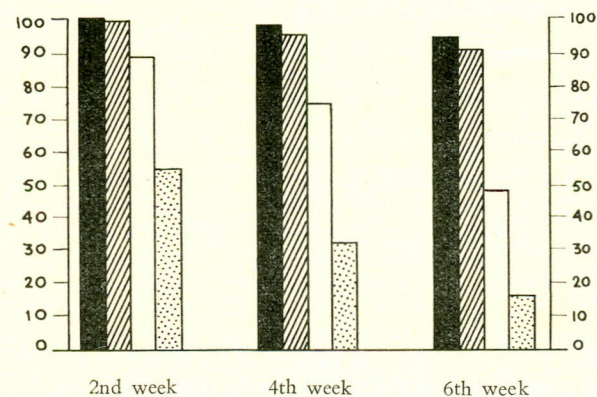
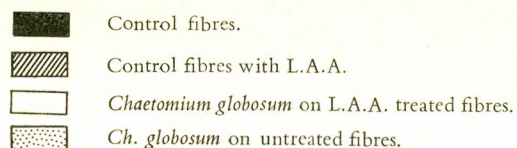


Fig. 2.—Percentage of variously treated jute fibres after three successive periods.



cotton yarns treatment with lignin acetic acid solution as protectant did not prove suitable against the deteriorative activity of *M. echinata* (Fig. 1). The percentage of loss in the breaking strength of untreated yarns at 14, 28, and 42 days harvest periods was 63, 70 and 82 respectively. With lignin acetic acid treated cotton yarns the percentage of loss in breaking strength at the above three intervals of time was 53, 65 and 70 respectively, showing only an insignificant improvement over the untreated yarn.

With jute fibres, however, this treatment

yielded some positive result against *Ch. globosum* as would be noticed from Table 2 and Fig. 2. The percentage of loss in breaking strength of untreated fibres due to *Chaetomium* at 14, 28 and 42 days harvest periods was respectively 45, 69 and 84 while with lignin acetic acid treated fibres the percentage of loss in breaking strength at three such intervals of time was respectively 11, 26 and 52. It is probable that the use of lignin acetic acid in higher concentrations may prove even more effective.

#### Acknowledgment

The authors are indebted to Dr. M. H. Khundkar for supplying the lignin acetic acid.

#### References

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