



## **Performance evaluation of lattice feeder for double roller gin**

**PG Patil<sup>1</sup>, VG Arude<sup>2</sup> and AB Dahake<sup>3</sup>**

**Research Note**

### **ABSTRACT**

The performance of the lattice feeder was evaluated and an average increase in ginning output of 8.46% at full capacity and 6.26% at half capacity of feeder was found. An overall 7% increase in ginning output was observed with the use of lattice feeder. It assists in even and constant distribution of loosened seed cotton along the knife edges of the beater. No adverse effect was observed on the fibre properties by the use of lattice feeder. The net income per day using feeder was found to be Rs.141 per day.

**I**n India 70 per cent of the cotton produced is ginned on double roller gins (Anap, 1994). Generally feeding of seed cotton to the gins is done manually, that required one labour to feed cotton to each gin machine. In spite of that, continuous and uniform feeding can not be assured due to human limitations including their carelessness. This results in low out-turn of the machines. To avoid this, the concept of controlled and automatic feeding came up.

Central Institute for Research on Cotton Technology (CIRCOT) in collaboration with M/s. Bajaj steel Industries, Nagpur has developed a lattice feeder. The feeder loosens the lumps of raw cotton and helps in even distribution of loosened cotton along the knife edges of the beater of the gin. The lattice feeder substitutes man power without any additional drives and increases productivity of the

machine and also reduces labour involvement in the gin operation.

The lattice feeder consists of feeder box in which two counter rotating endless belts are fixed at an angle to the vertical. The conveyor belt is made up of sandwiched cloth having grammage of 1623 gm/m<sup>2</sup>. The cloth is fixed over the rollers, which in turn is driven by link belts. Feeder rollers are driven at constant speed from gin leather roller. Three metal strips bearing spikes are fixed on each endless belt with a distance of 47 cm between two strips. The strips moves through the seed cotton in the hopper and cotton gets entangled to the spikes and carried over and feeds it along the knife edges of beater. In this way it also helps in agitating the the cotton in gin hopper and feeds cotton uniformly and continuously.

<sup>1</sup> Scientist and Officer In-charge, <sup>2</sup> Scientist and <sup>3</sup> Research Associate, Ginning Training Centre, CIRCOT, Nagpur, India

The developed lattice feeder was tested and evaluated for its performance in terms of capacity. The quality of the fibre obtained was also assessed, besides economics of use of lattice feeder.

Three varieties namely NHH-44, LRA-5166, and Ankur-651 were selected. Lattice feeder hopper was mounted on the double roller gin machine having working width 1061 mm. At the end of each trial the weight of lint and seed were measured and also lint samples were collected for measurement of quality parameters.

Belt speed were measured by using tachometer. Slippage in the belt was also found out. Effect of lattice feeder on fibre qualities was found out by testing the lint samples on High Volume Instrument (HVI) model 900 by Zellweger Uster (USA).

The cost economics of the lattice feeder was worked out by determining the additional expenses incurred per day and additional profit expected from lattice feeder per day. Net income per day and payback period was also found out.

## RESULTS AND DISCUSSION

An increase in output was observed with the use of lattice feeder (Table 1). The machine output was found to increase by 9.32%, 9.16% and 6.92% for NHH-44, Ankur-651 and LRA-5166 respectively when feeder hopper was filled to full capacity with average increase of 8.46%. When feeder hopper was filled to half capacity the increase in machine output was 5.11%, 9.62% and 4.15% for NHH-44, Ankur-651, LRA-5166 respectively with average increase of 6.26%. The overall increase in gin output in both type of experiments was found to be 7%. It was observed that the feeder hopper can accommodate 25 kg seed cotton at full capacity and if allowed to gin fully, it lasts for 10 min.

The increase in output may be due to continuous and uniform feeding to the knife edges and continuous agitating action at the bottom of the hopper by the spikes. The increase in ginning output was found more at full capacity than a half capacity of the feeder.

Table 1 Increase in ginning output using lattice feeder

Experiment	Variety	Weight of lint, kg	Weight of seed, kg	Total weight, kg	Time, min	Ginning percentage, %	Machine output, kg lint/h	% Increase in output over DR Gin
Full capacity	NHH 44	8.56	14.69	23.35	10	36.80	51.36	9.32
	Ankur 651	7.15	13.10	20.25	10	35.31	42.90	9.16
	LRA 5168	7.73	13.68	21.41	10	36.10	46.38	6.92
Half capacity	NHH 44	8.23	13.28	21.51	10	38.26	49.38	5.11
	Ankur 651	7.18	13.50	20.68	10	34.72	43.08	5.62
	LRA 5166	7.53	13.50	21.03	10	35.81	45.18	4.15
Without lattice feeder	NHH 44	7.83	13.38	21.21	10	36.92	46.98	
	Ankur 651	6.55	12.80	19.35	10	33.85	39.30	
	LRA 5166	7.23	12.40	19.63	10	36.83	43.38	

It may be because spike strips remain more longer in contact with the cotton and there are more chances of seed cotton getting entangled to the spikes which in turn feeds cotton to the knife of the beater.

The linear speed of lattice feeder was found to be 0.50 m/sec. No slippage was observed when feeder was filled to full and half capacity. The gin roller speed was 100 rpm.

The effect of lattice feeder on fibre properties

was studied by measuring 2.5% span length, fineness, strength and uniformity ratio. It was observed that there is marginal difference in the fibre properties when lattice feeder was used (Table 2). Lattice feeder does not have any adverse effect on the fibre properties.

The estimated net income per day by using feeder was found to be Rs. 141 per day. The pay back period is found to be 156 working days (2 shifts/day). The cost of feeder can be recovered within one and half season.

Table 2 Effect of lattice feeder on fibre properties

Experiment	Variety	2.5% span length, mm	Uniformity ratio, %	Fineness micronaire, 10 <sup>6</sup> g/inch	Bundle strength tenacity, g/tex at 3.2 mm gauge
Full capacity	NHH 44	28.3	49	3.8	20.8
	ankur 651	25.2	45	3.1	16.8
	LRA 5168	26.4	49	4.1	18.0
Half capacity	NHH 44	27.7	47	3.6	22.0
	Ankur 651	24.9	44	3.4	15.3
	LRA 5166	26.6	48	4.1	19.3
Without lattice feeder	NHH 44	26.8	47	3.4	19.8
	Ankur 651	26.1	46	2.6	17.4
	LRA 5166	26.7	47	4.2	16.5

#### REFERENCES

Annon.1995. Automatic gin feeder operating and service manual . Platt Saco Lowell (UK) Ltd., pp: 1-20.

Anap GR. 1994. Status Report on Ginning Industry of Maharashtra.,GTC of CIRCOT, Nagpur.