

EFFECT OF TREE BELTS ON THE YIELD OF AGRICULTURAL CROPS

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Summary. A study conducted to find out the effect of 3-row belts of *Eucalyptus camaldulensis* on the yield of Agricultural crops has indicated that when the trees were 5 to 6 metre in height and wheat was sown the yield was not depressed. However, in the case of cotton, when the height of the tree belts was upto 7 metre the yield was comparatively poor within a distance of 15-30 meter on either side of the belt.

Introduction. With a view to demonstrating the usefulness of wind breaks as an agricultural aid in the wind affected areas of Pakistan, a study was started in January, 1980. For this purpose an area of 60 ha was selected near Mirpur Khas in the Province of Sind. The experimental site is an irrigated plain close to "Thar" desert. The crops in the area are affected by westerly winds coming from the sea and easterly winds coming from the desert, 80 and 50 kilometre away respectively.

Shelterbelts were planted in January-February, 1980 at right angles to the prevailing wind direction. 9-month old nursery raised *E. camaldulensis* plants were planted in three rows comprising a belt, with 2 metres row to row and one metre plant to plant distance, staggering the plants in adjoining rows. Four such belts spaced at 181 to 196 m and 630 m in length were planted. Planting was also done along the road in the form of a belt comprising 3 rows.

A single row of eucalypts spaced one metre apart was also planted across all the belts along the eastern boundary of all the plots. Planting was done in one metre apart slots made on the berms of trenches which served as the irrigation channels for the water coming from canal or in case of closure through an electrically operated lift irrigation pump.

Growth measurements. Height and diameter of the sample trees were recorded in November, 1981 taking every tenth tree as a sample in a row. Following are the average measurements:

Agricultural crops. Sowing of agricultural crops was started when the belts were about 10 months old. At that time the height of trees was 5-6 m. Two agricultural crops have been sown so far, wheat and cotton.

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Average Height and Diameter

Belt No.	Row No. 1		Row No. 2		Row No. 3	
	Average height (m)	Average diameter (cm)	Average height (m)	Average diameter (cm)	Average height (m)	Average diameter (cm)
1	7.79	6.27	7.73	6.09	7.66	6.22
2	7.59	5.65	6.80	4.45	6.64	4.64
3	5.18	4.18	5.44	3.96	4.98	4.01
4	6.13	4.65	5.80	4.16	5.86	4.64
5	4.75	3.92	5.08	3.90	5.52	4.62

A. *Wheat.* The Pavan variety of wheat was sown in the area from October 25 to November 20, 1980 after ploughing the area twice. Fertilizer was applied at three different times. Four irrigations were given.

Analysis of data indicated that the distance from the tree belt had no significant effect on yield of either grain or straw.

B. *Cotton.* After the area was cleared of wheat crop remains N-T variety of cotton was sown in April-May, 1981. The land was ploughed with mechanical harrowing after wheat harvest in April, watered and reploughed again as before. Levelled thoroughly for seed bedding. Sowing was done in April and May with seed rate of 25 kg/ha in lines, 50 cm apart, 9 cm deep with drill.

Single super phosphate at the rate of 500 kilograms per hectare at the time of bed preparation, ammonium sulphate at the rate of 250 kilograms per hectare at the time of sowing and urea at the rate of 190 kilograms per hectare in two doses at the time of 3rd and fourth irrigation were applied as fertilizers.

47.5 centimetre depth of water was applied during the duration of the crop, 10 centimetre as soaking dose, 7.5 centimetre after 45 days and subsequently four irrigations of 7.5 depth each. After 25 days of sowing when plant height was about 25 centimetre, thinning was done keeping the plants 30 to 60 centimetre apart. The following insecticides were applied to control the pathogens like thrips white-flies, jassids, spotted bole-worms, heliathes, mites:

1st spray (last week of July) = Dimethoate (Rogor and Roxion) = 400 c.c./acre.

2nd spray (August) Sumicides = Dimethoate (200 + 400 c.c respectively)/acre.

3rd spray (3rd week July) Azodin = 800 c.c./acre.

A very interesting observation has been recorded so far as seed germination is concerned. The seed failed to germinate within about 3 m distance of all the tree belts. However, when seed was resown on ridges and water allowed to

stand in the furrows the seed did germinate. These late seedlings could not catch up with the rest of the crop.

Sampling Procedures

- a. Sample plot size: To sample cotton yield a sample plot of 3 m² was used, which permitted a fairly large number of plant population, uniform in number under method of line sowing.
- b. Sampling intensity: 20% of transect line.

Sampling was conducted along a transect line running laterally from one belt to the next belt in the direction of wind. To lay a transect the most uniform patches of crop were selected, thus excluding saline or bare patches. Sample plots were run from south to north to maintain relationship of samples and the wind break.

12 quadrats were laid in 180 m stretch of belts span by taking at random a 3 m stretch in every 15 m length in successive intervals. 4 wooden rods, each 2 m in length were fixed firmly on the 3 x 3 m quadrat points after careful measurements and a tight string encircled the rods, to mark the sample plot. All plants with main stem, being inside the boundary of string were taken as "in" plants regardless of their tops. As, cotton is picked twice, thus reference points were pegged and corner plants tagged with a ribbon for next picking. This also served as a "warning" to routine pickers so that the plots were not disturbed. Cotton was picked manually and weighed the same day.

Analysis of data indicated that:

Maximum yield was obtained between 60-75 m distance from the belt.

Yield was minimum from the spans of 15-30 m and 165-180 m.

Yields from spans 15-30, 30-45, 45-60, 60-75, 90-105, 105-120, 120-135 and 135-150 did not differ significantly.

Discussion. Low yields in the spans close to the belts is attributable to no germination in the first instance and late germination when the seed was resown on the ridges and water made to stand in furrows for quite sometime help germination. Maximum yield from almost centre of the field indicates that the trees did depress the yield of cotton.

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