

EFFECT OF TREE ROWS ON THE YIELD OF WHEAT CROP

By

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SUMMARY

To assess the effect of tree windbreaks of Shishan and Simal on the yield of wheat crop, a study was carried out at Chichawatni during 1986 under irrigated conditions. The wheat was sown in 1 m x 1 m sample plots along transect lines. The results indicate loss of grain yield especially near the tree row which could be minimized by improved cultural practices and control of weeds.

INTRODUCTION

Pakistan is deficient in wood resources. State forests merely cannot meet the demands of wood in the country. So trees on farmlands can be of immense help to the production from the state forests. Need of the day is planting of trees on farmlands. Research has been going on in the country showing that trees can be combined with agri-crops without suppressing the yield of the latter. Various combinations have been suggested for this purpose.

Farmers mostly plant windbreaks or shelterbelts along border of agri fields or along water courses irrigating their fields. Trees can fetch additional income for the farmer besides his income from agri crops.

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STUDY SITE

Data was collected from farmlands near Chichawatni (District Sahiwal) which lies in "arid sub-tropical continental low lands" climatic region characterised by great annual and diurnal variations in temperatures. Mean maximum temperature is 32° C to 46° C and mean minimum temperature is 5.5° to 18° C. A few frosty days also occur. Rainfall varies from 90 to 350 mm. Tract is subjected to frequent dust storms during summer. The results given here have been obtained from the data collected from agricultural fields already planted with windbreaks. The following two sites were selected in the vicinity of Chichawatni town during wheat harvest season in 1986 to assess the effect of tree rows on the yield of wheat crop:

- I. Faqeer Anwar-ud-Din Agricultural Farm
Chak No.37/12.L, 6 km from Chichawatni.
- II. Janjua Agricultural Farm Chak No.117/12.L,
about 18 km from Chichawatni towards Multan
along Lahore-Multan Road.

MATERIAL AND METHODSSite-I Faqeer Anwar-ud-Din Agricultural Farm

A row of eight years old simal trees having length of 35 meters oriented East-West along water channel was selected to study its influence on the yield of wheat crop. The trees planted 3 m apart, had an average height of 14 m and average dbh 40 cm. The farm was canal irrigated. Wheat variety WL-711 was sown in December, 1985 with a seed rate of 87 kgs per ha. DAP 2.5 bags (50 kgs per bag) per ha. at the time of seed bed preparation and 6.25 bags (50 kgs per bag) of Urea per ha. with

subsequent irrigations after sowing were applied. Overall five irrigations were given.

To collect the wheat yield data one m^2 sample plots were taken systematically along transect lines running laterally from windbreak on southern as well as on northern side. Four transects were taken on each side, each having five quadrats at distances of 2 m, 6 m, 10 m, 14 and 18 meters from the row on southern side while 0.5 m, 4.5 m, 12.5 m and 16.5 m on northern side. Five sample plots of same size ($1 m^2$) were also taken from control. The wheat within the sample plots was cut manually tagged for respective distances, sun dried, thrashed and grain yield recorded. Yield of wheat from the control was projected and came to 4050 kgs/ha.

Site-II Janjua Agricultural Farm

On this farm effect of single row of shisham trees on the yield of wheat crop was studied. Average height of the trees was 13 m with average dbh 18 cm. Age of the shisham trees was six years. Length of windbreak was 36 m oriented North-South and tree to tree distance was 2.5 m.

WL-711 wheat variety was sown in December, 1985 using seed rate 87 kgs/ha. by broadcast method. At the time of seed bed preparation $2\frac{1}{2}$ bags (50 kgs each) per ha. was also added at the time of first irrigation after sowing. As a whole seven (7) irrigations were given.

Wheat crop was sampled by laying out four lateral transects to windbreak on the western side of the tree row. Sample plot of size 1 m^2 was used and five sample plots in each transect were taken at a distance of 1.5 m, 4.5 m, 7.5 m, 10.5 m, and 13.5 m from the row. Five sample plots of same size in a field adjacent to the experimental field having no influence of trees were taken. Sampled wheat was harvested manually, sun-dried and thrashed.

RESULTS AND DISCUSSION

Site-I

The average grain yield from samples of four transects has been tabulated in Tables I & II. The projected average yield data at different points from the windbreak has been plotted graphically in Fig.I and Fig.II alongwith average control yield.

Data tabulated shows that the trees had depressed the yield of wheat upto a distance of 8.5 m on northern side of the windbreak. However, beyond this distance increase in yield can be seen in comparison to control. On the other hand there is no effect of tree shade on the yield of wheat crop on the southern side of the windbreak. Winds generally blow north to south direction which cause reduction in the yield of agri. crops. So in this case wind blown has depressed the yield of wheat crop on the northern side but on the southern side the yield of wheat crop is more near the windbreak which is due to protection from the

Table I: Yield of Wheat at various distances on southern side of the tree row (Simal).

Distance from the tree row to sample plot (m)	Average yield ₂ in gms/m ²	Projected average yield in kgs/ha.	Projected difference from control in kgs/ha.
2	442.5	4425.00	+375.00
6	433.75	4337.50	+287.50
10	416.25	4162.50	+112.50
14	401.25	4012.50	- 37.50
18	418.25	4187.50	+137.50

Table II: Yield of Wheat at various distances on northern side of the tree row (Simal)

Distance from tree row to sample Plot (m)	Average yield in gms/m ²	Projected average yield in kgs/ha.	Projected difference from control in kgs/ha.
0.5	285.00	2850.00	- 1200
4.5	307.50	3075.00	- 975
8.5	388.75	3887.50	- 162.50
12.5	416.25	4162.50	+ 112.50
16.5	417.50	4175.00	+ 125.00

FIG. 1: EFFECT OF SIMAL TREE ROW ON WHEAT CROP (SOUTHERN SIDE)

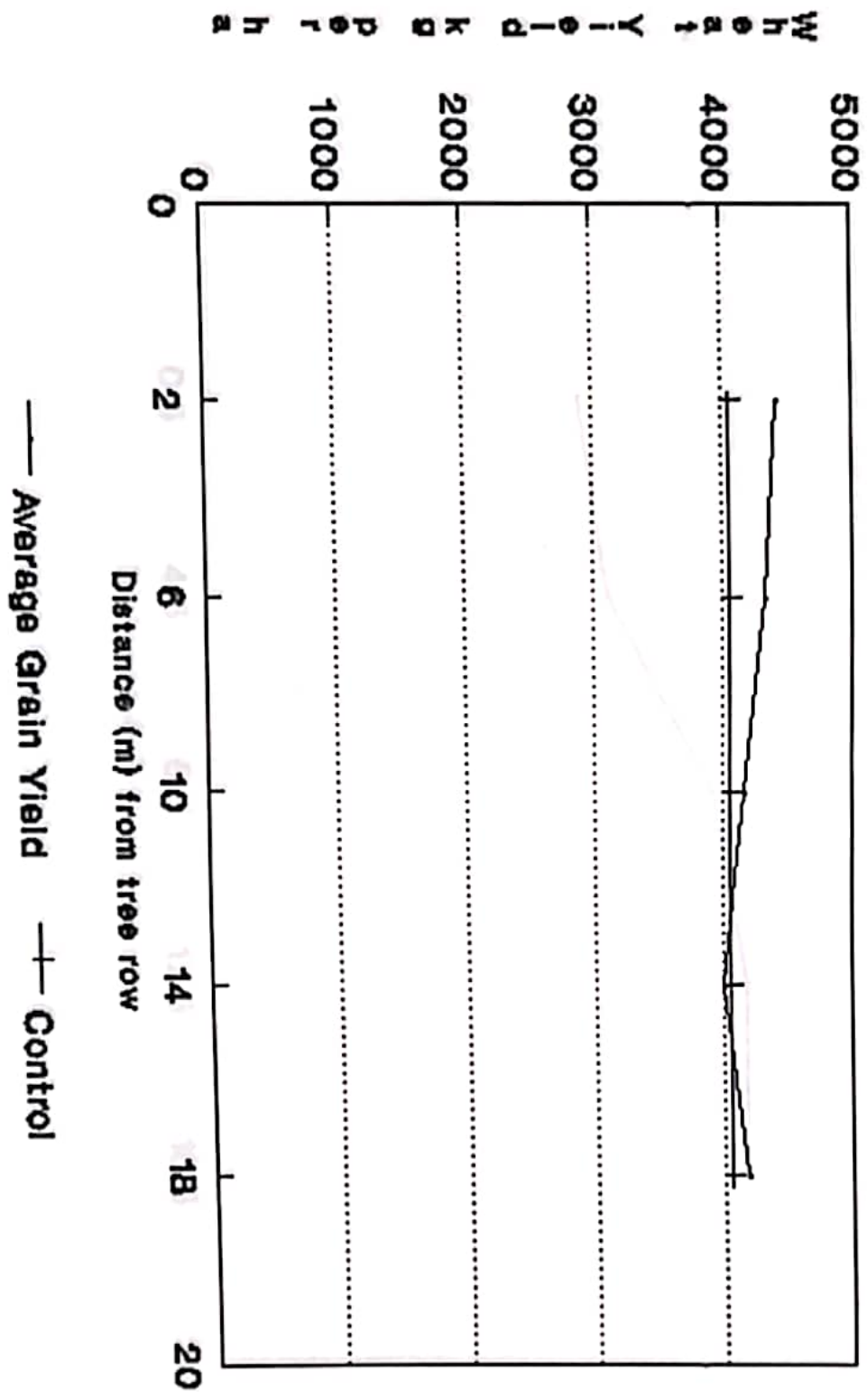
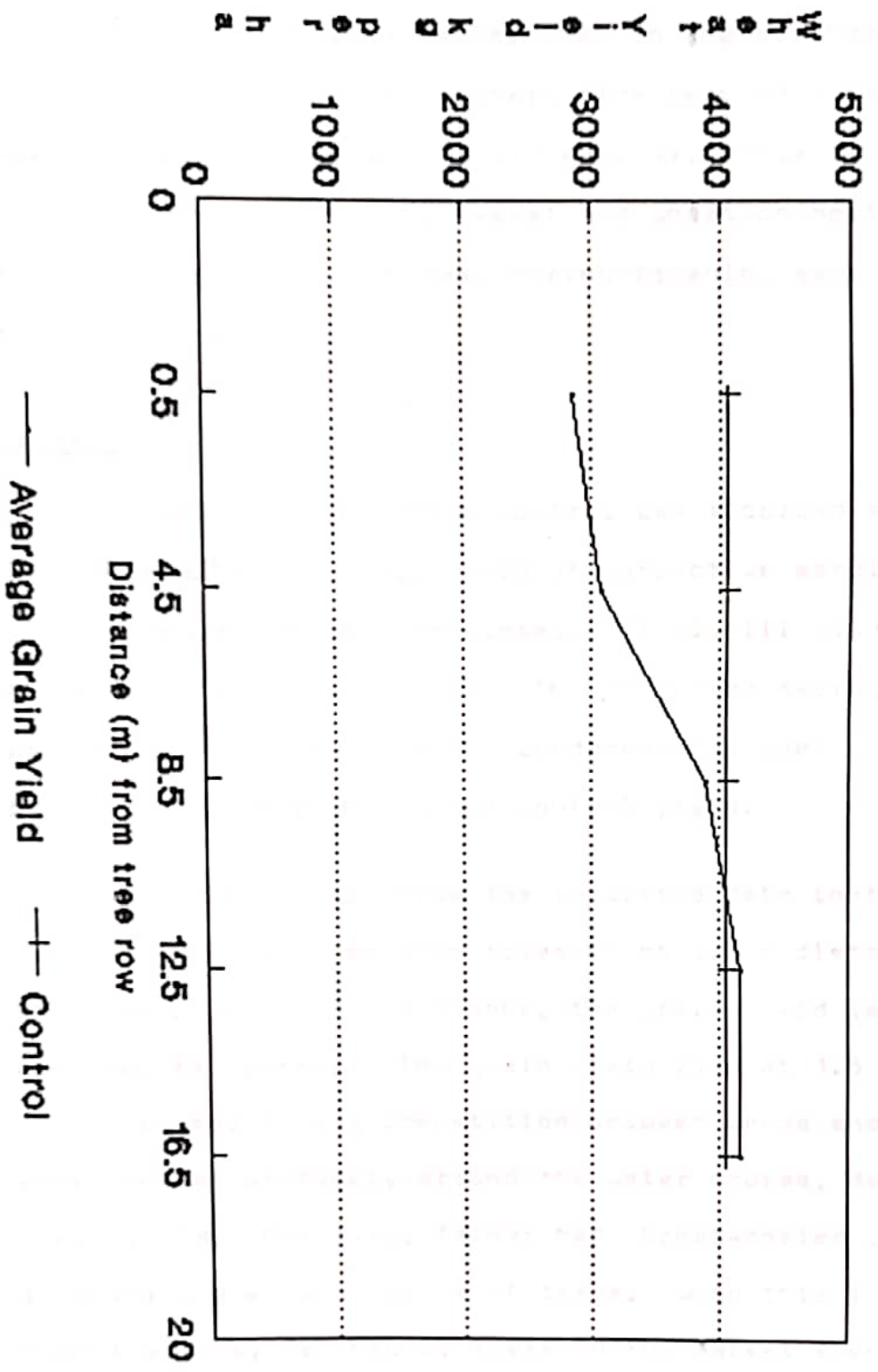


FIG. 11: EFFECT OF SIMAL TREE ROW ON WHEAT CROP (NORTHERN SIDE)



wind. In addition to this it has been observed that the yield on the northern side is lesser than on the southern side. Moreover, wheat crop on northern side took more days to ripe while on southern side it ripened earlier. This is because the windbreak was oriented East-West and wheat on northern side received less light and heat during ripening season as compared to southern side.

Site-II

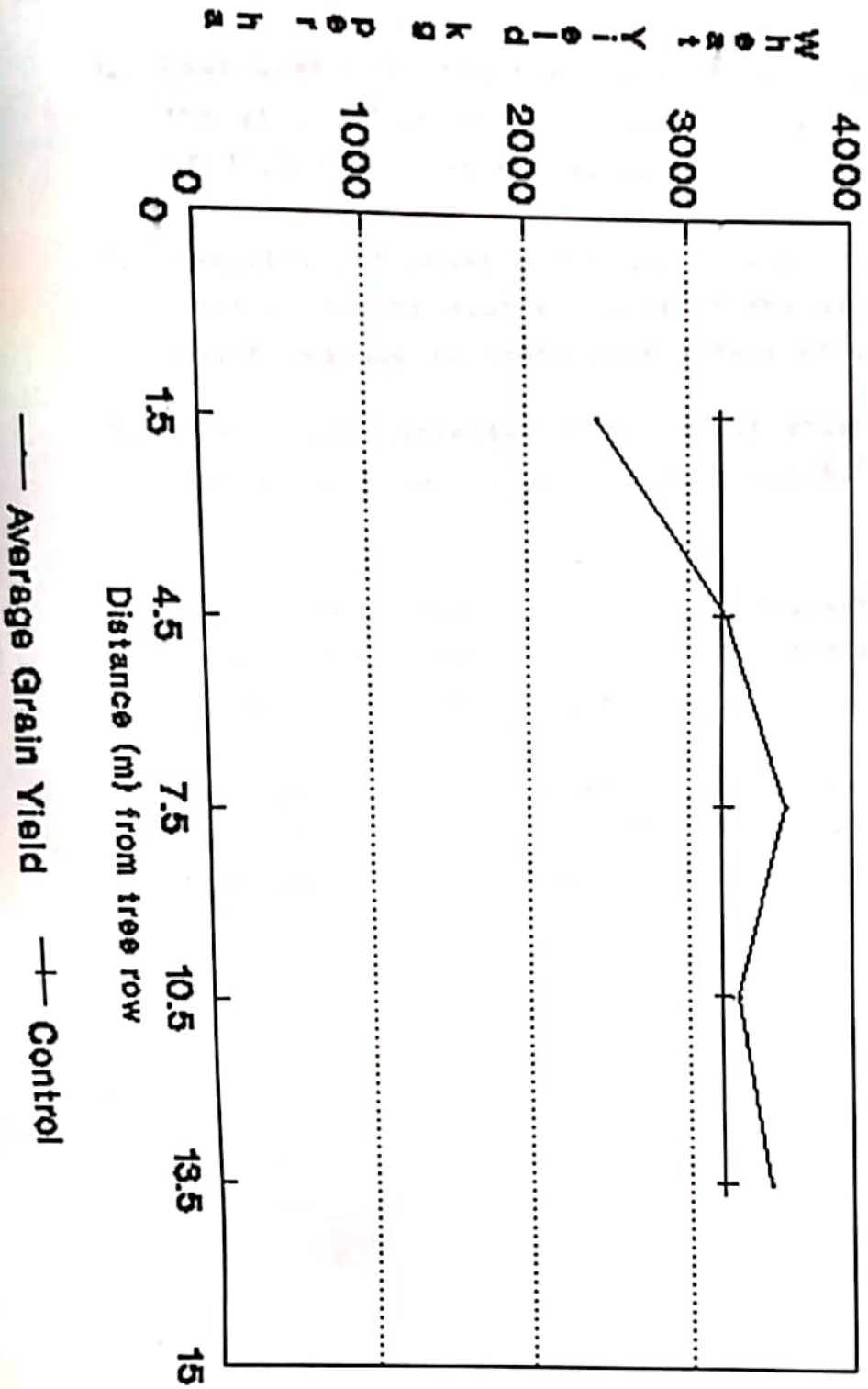
Yield of wheat from control was recorded and projected to 3200 kgs/ha. Average yield of respective sample plots in all transects has been tabulated in Table-III alongwith projected difference from the control. The projected average yield data at different points from the windbreak has been plotted graphically in Fig.III alongwith average control yield.

It is obvious from the tabulated data that the maximum negative effect of shisham trees is at 1.5 m distance from the windbreak. At 13.5 m distance, the grain yield is more as compared to control. The grain yield loss at 1.5 m distance can be attributed to the competition between weeds and wheat, weeds were growing profusely around the water course, depressing the wheat yield. Moreover, farmer had broadcasted less seed in this strip due to presence of trees. When this loss is compared with the money fetched by trees in the market then this is more than compensated.

Table III: Yield of wheat at different distances on the western side of the tree row (Shisham).

Distance from the tree row to the sample Plot(m)	Average yield ₂ in gms/m ²	Projected average yield in kgs/ha.	Projected difference from control in kgs/ha.
1.5	243	2430	- 770
4.5	323	3230	- 30
7.5	359	3590	+3590
10.5	330	3300	+ 100
13.5	349	3490	+ 290

**FIG. III: EFFECT OF SHISHAM TREE ROW ON WHEAT CROP
(WESTERN SIDE)**



CONCLUSIONS

1. East-West oriented tree rows of simal depressed the yield of wheat grain upto an average distance of 10.5 m on northern side.
2. The yield of wheat grain was more as compared to control on the southern side of the simal windbreak which was due to protective effect of windbreak.
3. North-South oriented windbreak of shisham depressed the yield of wheat grain upto about 6.0 m on western side.
4. Beyond this distance the yield of wheat was more as compared to control which can be attributed to the protective effect of windbreak.
5. The little loss in wheat yield is more than off-set by the income and products from the trees and due to the beneficial effects of trees on agricultural crops.