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## EFFECT OF TREE ROWS ON THE YIELD OF WHEAT CROP

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### SUMMARY

A study was carried out at Chichawatni during 1986 under irrigated conditions to assess the effect of tree windbreaks of Shisham and Simal on the yield of wheat crop. The wheat was sampled 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 alone cannot meet the demands of wood in the country. So trees on farmlands can complement wood production from the state forests. Therefore, planting of trees on farmlands is need of the day. Current research in the country has shown that trees can be combined with agri-crops without suppressing the yield of the latter. Various combinations of trees/crops have been suggested for this purpose.

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

### 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:

1. Faqeer Anwar-ud-Din Agricultural Farm Chak No.37/12.L, 6 km from Chichawatni.
2. Janjua Agricultural Farm Chak No.177/12.L, about 18 km from Chichawatni towards Multan along Lahore-Multan Road.

### MATERIAL AND METHODS

#### Site-1 Faqeer Anwar-ud-Din Agricultural Farm

A row of eight years old Simal (*Salmaalina molabarica*) tree with a length of 35 meters and 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 seed at 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

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irrigations were given.

To collect the wheat yield data one m<sup>2</sup> 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, 6, 10, 14 and 18 meters from the row on southern side while 0.5, 4.5, 12.5 and 16.5 meters on northern side. Five sample plots of same size (1 m<sup>2</sup>) were also taken from control area without trees. The wheat within the sample plots was cut manually tagged from respective plot, sun dried and grain yield recorded. Yield of wheat from the control estimated at 4050 kgs/ha.

#### Site-2 Janjua Agricultural Farm

On this farm effect of single row of Shisham (*Dalbergia sissoo*) 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 with north-south orientation and tree to tree distance was 2.5 m.

WL-711 wheat variety was sown in December, 1985 using seed at 87 kgs/ha by broadcast method. At the time of seed bed preparation 2½ bags (50 kgs each) of fertilizer per ha was added. On the whole seven irrigations were given to the crop.

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<sup>2</sup> was used and five sample plots on each transect were taken at a distance of 1.5, 4.5, 7.5, 10.5 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 trashed.

## RESULTS AND DISCUSSION

### Site-1

The average grain yield from samples of four transects has been tabulated in Table 1 and 2. The average yield data at different points from the windbreak has been plotted graphially in Fig. 1 and Fig. 2 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 in north to south direction which cause reduction in the yield of agriculture crops. Therefore, in this case, wind has depressed the yield of wheat crop on the northern side but the yield of wheat crop is more near the windbreak on the southern side which is due to protection from the wind. In addition to this it has been observed that the yield on the northern side is less 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-2

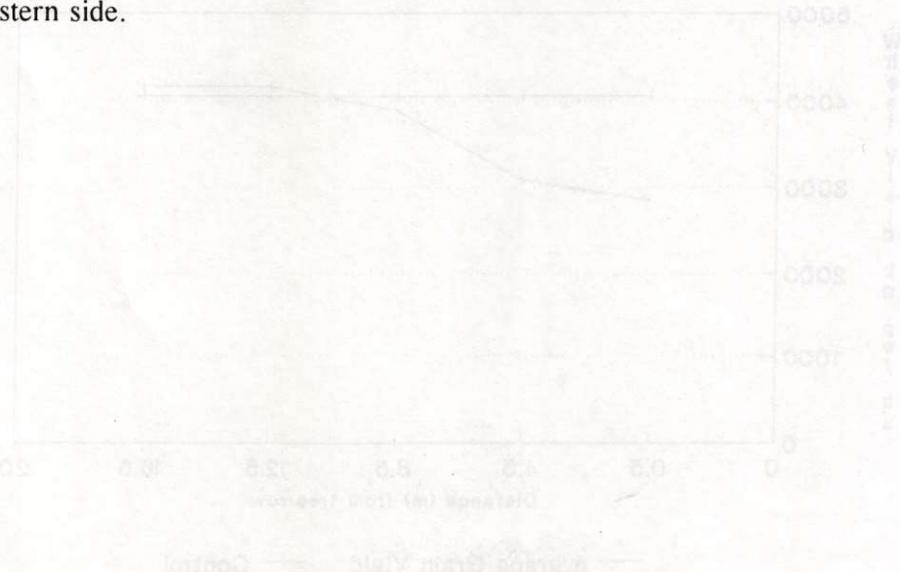
Yield of wheat from control was recorded and estimated at 3200 kgs/ha. Average yield of respective sample plots in all transects has been tabulated in Table-3 alongwith projected difference from the control. The projected average yield data at different points from the windbreak has been plotted graphically in Fig.2 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 on the water course, depressing the wheat yield. Moreover, farmer had sown 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.

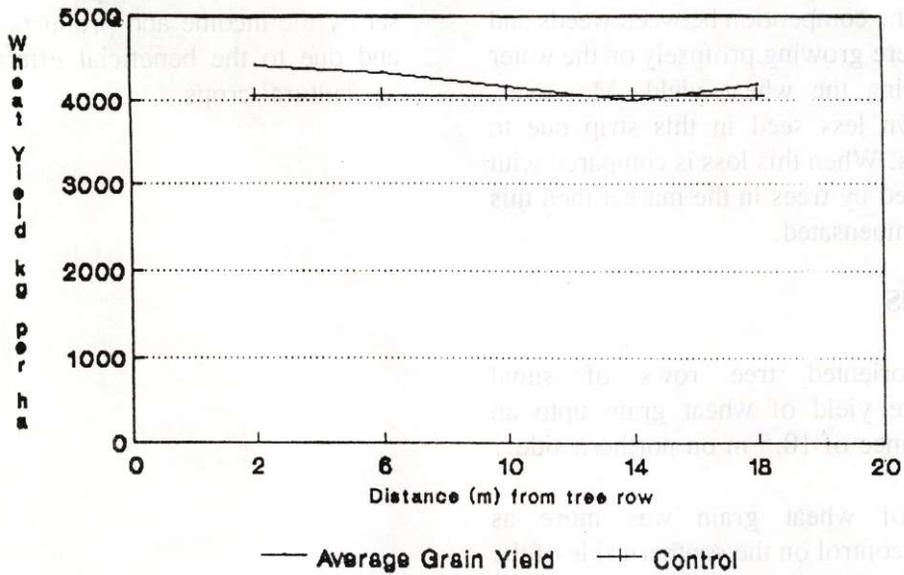
### CONCLUSIONS

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.

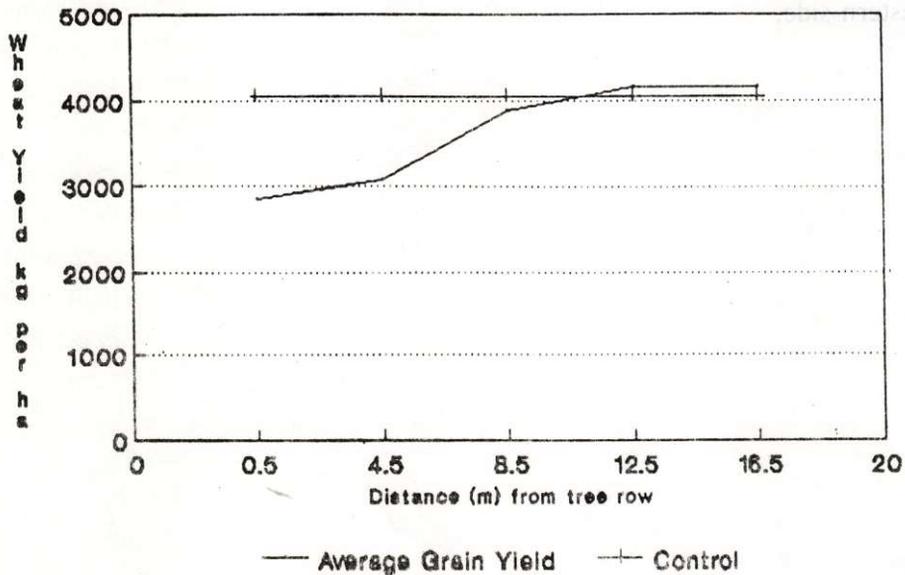
4. Beyond this distance the yield of wheat was more as compared to control which can be attributed to the protective effect of windbreak.
5. The little loss in wheat yield is more than offset by the income and products from the trees and due to the beneficial effects of trees on agricultural crops.



**Fig.1. EFFECT OF SIMAL TREE ROW ON WHEAT CROP  
(SOUTHERN SIDE)**



**EFFECT OF SIMAL TREE ROW ON WHEAT CROP  
(NORTHERN SIDE)**



# EFFECT OF SHISHAM TREE ROW ON WHEAT CROP (WESTERN SIDE)

Fig. 2.

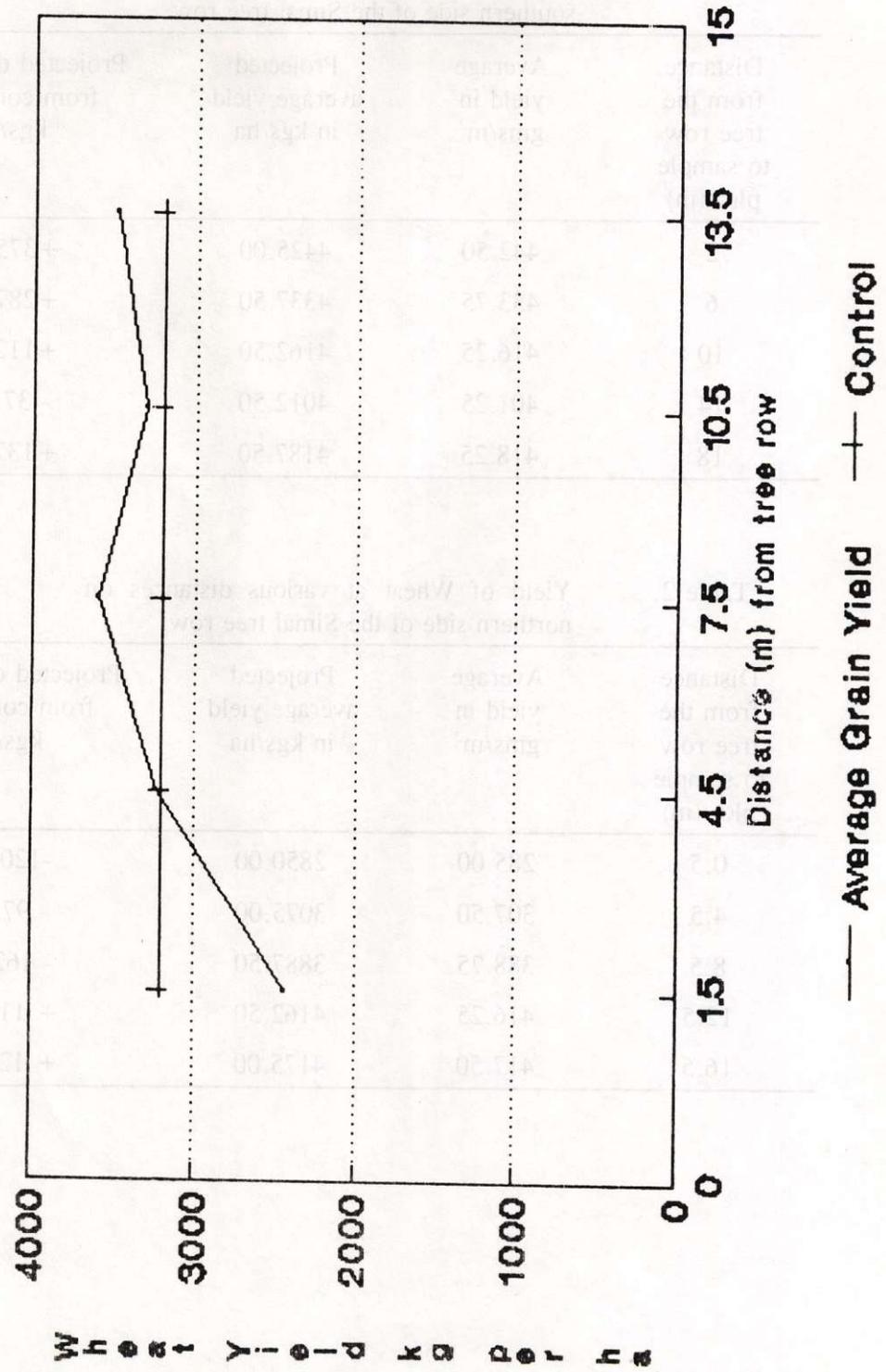


Table 1. Yield of wheat at various distances on southern side of the Simal tree row

Distance from the tree row to sample plot (m)	Average yield in gms/m <sup>2</sup>	Projected average yield in kgs/ha	Projected difference from control in kgs/ha
2	442.50	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 2. Yield of Wheat at various distances on northern side of the Simal tree row

Distance from the tree row to sample plot (m)	Average yield in gms/m <sup>2</sup>	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

Table 3. Yield of Wheat at different distances on the western side of the Shisham tree row

Distance from the tree row to sample plot (m)	Average yield in gms/m <sup>2</sup>	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	+ 390
10.5	330	3300	+ 100
13.5	349	3490	+ 290