
EFFECT OF SHISHAM (*DALBERGIA SISSOO*) TREES ON THE YIELD OF WHEAT

CROP - I

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ABSTRACT

A study was carried out in village Satrah, District Sialkot to determine the effect of shisham (*Dalbergia sissoo*) on the yield of wheat crop. Fifty trees of variable diameter and heights were selected for this study. The trees were on the southern side of the field and were divided into seven diameter classes e.g. 15-19.9, 20-24.9, 25-29.9, 30-34.9 cms, 35-39.9, 40-44.9 and 45-50 cms. *Dalbergia sissoo* trees affected crop height upto a distance of 11.0 meters but the effect was statistically non-significant. On the other hand both the biomass and grain yield was significantly affected upto a distance of 8.5 meters.

INTRODUCTION

Pakistan is extremely short of forest area and there is little scope of any additional area being transferred to the forest departments for forestry purpose. Hence maximum potential for increasing the tree wealth of the country is seen in encouraging farm forestry. There is a general notion that trees reduce crops yield in their neighbourhood. Although a few studies have been made in Pakistan to study the effect of trees on the yield of agricultural crops, more studies are needed to examine the interaction between woody and non-woody components of the agroforestry combinations. Therefore, this study was undertaken to study the effect of trees of *Dalbergia*

sissoo on the growth and yield of wheat. The present study is confined only to the losses of agricultural crops due to tree effect. However, the benefits from the trees will be considered in the second issue of this publication where economics will be calculated.

Khan (1984) observed that the reduction in yield of wheat was more in case of grain yield which was reduced by 10-25% by every time shade of 3-4 hours/day. The grain yield decreased 52-60% when the duration of daily shade was 6 hours. The effect of shisham tree windbreaks/ shelterbelts was studied in Thal desert (Pakistan) on the yield of wheat crop grown under irrigated conditions by Sheikh et al 1984). Wheat was sampled in 1m² plots along transect lines on the leeward side. The results obtained indicate a net gain in grain yield. There was also a loss of grain near the tree rows which could be minimized by improved cultural practices and control of weeds. However, the economic gain from the sale of wood obtained from wind breaks more than compensated the loss.

Financial analysis of shelterbelt agroforestry system were compared for some regions in Pakistan by Subhan (1990). The study reveals that shelterbelts, though they may be competitive in biological terms, are supplementary in financial terms. The net present value analysis found wheat

and sugarcane fields with poplar windbreaks to be financially sound in the Peshawar valley of NWFP. Similarly, the agroforestry options of wheat sheltered by rows of shisham in the Mianwali region of Punjab and of wheat sheltered with Eucalyptus in Tharparkar, Sindh were financially superior, to wheat monocropping. The study suggests positive financial incentives to land owner and tenant farmers for establishing shelterbelt agroforestry in these regions of Pakistan.

In an MPTS study at ICRAF's field station, it was observed that unpruned *Leucaena* proved extremely competitive with inter planted annual crops, resulting in crop yields at one fourth to one half the levels obtained under pure stand. When the trees were pruned regularly to a height of 50 cms crop yield were normal. Crop yield associated with *Acacia albida* were as high as controls when the trees were young and only slightly lower during the later years of trial, suggesting that this tree species was not seriously competitive with adjacent crops (ICRAF, 1989).

MATERIALS AND METHODS

50 trees of *Dalbergia sissoo* at village Satrah were selected to see the tree effect on wheat crop. All the trees varied in diameter and height and were on the Southern side of the field. Diameter of the trees was measured with the help of a calliper at 1.3 meter above the ground level. The trees were divided into seven diameter classes i.e. D1=15-19.9 cms, D2=20-24.9 cms, D3=25-29.9 cms, D4=30-34.9 cms, D5=35-39.9 cms, D6=40-44.9 cms, D7=45-49.9 cms.

The wheat variety Pak-81 was sown on November 14, 1987. A basal dose of fertilizer @ 140 kg nitrogen, 100 kg

P_2O_5 /ha in the form of urea and single super phosphate respectively was applied. All P_2O_5 and half of nitrogen was applied at the time of sowing, while subsequently nitrogen was applied with second irrigation.

Four irrigations were applied during entire growing period of the crop. Five samples of $1m^2$ each of wheat crop were taken at the distance of 1.0, 3.5, 6.0, 8.5 and 11.0 m from the main trunk of the tree and sixth control sample was taken from a shade free location of the same field and following observations were recorded.

- i. Plant height (cms)
- ii. Above ground biomass (gms)
- iii. Grain yield (gms)

RESULTS AND DISCUSSION

Crop Height: The data of table 1 for wheat crop height shows that although the crop height is directly related to the distance from tree trunk, yet this relationship is very weak and statistically insignificant. The average crop height increased from 91 cms to 95.6 cms upto a distance of 11.0 meters from the tree trunk. The height remained constant at farther distances indicating that the trees didn't have any effect beyond 11.0 meters distance.

Data of table 1 also indicated that tree size didn't have any effect on crop height. The variation in data failed to show any positive or negative trend. The average height of crop near smaller trees (15-20 cms) was 94.2 cms whereas the average crop height for larger trees was 93.6 cm (45-50 cms dia class). These results agreed with the findings of Sheikh and Cheema (1976), Ismail (1977) who indicated that there is no adverse effect on the crop height even in areas close to the trees while

these findings are contrary to that of Khan and Aslam (1975), and Sheikh and Haq (1978). The possible reason for this disagreement appears to be the use of dwarf wheat varieties, which are apparently not sensitive to the proximity of trees regarding their height growth.

Total Biomass Yield

The data of table 1 clearly indicates that total above ground biomass was significantly affected by the distance from the tree trunk. The total biomass yield increased from 380.2 grams to 790.9 gms with increase in distance from 1.0 m. to 8.5 m. from tree trunks. Beyond these distances, the biomass yield remained more or less constant.

The data of table 2 shows that there was no clear pattern of the effect of tree size on biomass yield. There was some indication that larger size 40-50 cms class did decrease biomass yield as compared to all other size classes from 663.4-593.8 gms. Detailed consideration of the data indicated that the pattern of the effect of tree size on biomass yield of wheat was similar at various distances from the tree trunks. The reduction in biomass yield may be due to edge effect combined with tree effect. The data confirms the results of Sheikh 1973; Sheikh & Haq (1978), Khan (1984) and are contrary to that of Keerio (1982).

Grain Yield

The data of table 2 clearly indicate that distance from tree trunks has highly significant effect on grain yield of wheat crop. The grain yield increased from 173.5 gms to 360.8 gms with increase in distance from 1.0 m to 8.5 m from tree trunks, the grain yield remained more or less constant beyond this distance. The data of table 2 also

showed that there was no clear pattern of the effect of tree size on grain yield. There was some indication that larger size (40-50 cms) class did decrease grain yield as compared to yield of all other size classes from 293.2-276.2 gms. It was interesting to note that class No.4 (30-35 cms) had least negative effect on grain yield. The reason for this anomaly could not be traced other than experimental error. The reduction in grain yield can be attributed to proximity of trees. This data confirmed the results of Khan and Aslam (1975), Khan (1984) and Lone (1989). These results, however, are contrary to those of Aydemir (1975), Sheikh and Cheema (1976) and Vesil'ev (1978), who reported that there was no adverse effect on the yield even in the areas quite close to the trees. This difference may be due to local factors such as direction of tree lines, climate, type of trees and nature of soils etc.

CONCLUSION

There is, no doubt, some loss in the yield of wheat grain and straw in the vicinity of tree rows but this loss is more than compensated through the sale of tree products.

LITERATURE CITED

1. Aydemir, H. 1975. Influence of forest shelterbelts at the Bela State Farm (in Central Turkey) on micro-climate and agricultural production. Ormancilik Arastrima Enstitusu Yayinlari Teknik Serisi No.68, IV. (Forestry Abstracts, 37 (7). 406, 1976).
2. Ismail, G. 1977. The effect of shading on the growth of young plants. Ringhakan Publikasi dan Laporan Penilitian Pertanian, Indonesia, 7(2):12-13. Field Crop Absts. 32(6):4166, 1979.
3. Keerio, G.R. 1982. Effect of windbreaks on the growth and yield of agricultural crops. Pak.J.Botany, 14:23.
4. Khan, A.Sardar. 1984. Wheat production in barani tract. The Pakistan Times dated 10-2-1984.
5. Khan, G.S. and M.Asiam. 1975. A study of the shading effect of Shisham trees on wheat. Pak.J.Agric.Sci. 12(3-4):281-284.
6. ICRAF. 1989. Agroforestry for Africa's semi arid zone. "Experience from ICRAF's field station. 1(1).
7. Lone, N.B; 1989. Affect of tree shade on yield and yield components of wheat crop. M.Sc. thesis, University of Agriculture, Faisalabad.
8. Sheikh, M.I. 1973. Study report of fast growing species project, Italy. pp. 1-75.
9. Sheikh, M.I., A.Khalique and M.Noar. 1984. Effect of windbreaks on the yield of wheat in Thal desert under irrigated conditions Pak.J.For. 34(3):137-144.
10. Sheikh, M.I. and A.M. Cheema. 1976. Effect of tree lines grown on the border of wheat fields. Pak.J.For 26(4):265-268.
11. Sheikh, M.I. and Riazul Haq. 1978. Effect of shade of *Acacia arabica* (kikar/babul) and *Dalbergia sissoo* (shisham) on the yield of wheat. Pak.J.For. 28(4):183-185.
12. Subhan, F. 1990. Financial analysis of selected shelterbelts systems in Pakistan. Pak.J.For 40(3):252-252.
13. Vesil'ev, M.E. 1978. Shelterbelts as a means of improving yield quality. Lesoni Zhurnal (1978) No.5, 26-31. Forestry Absts. 41(2). 1162, 4656.

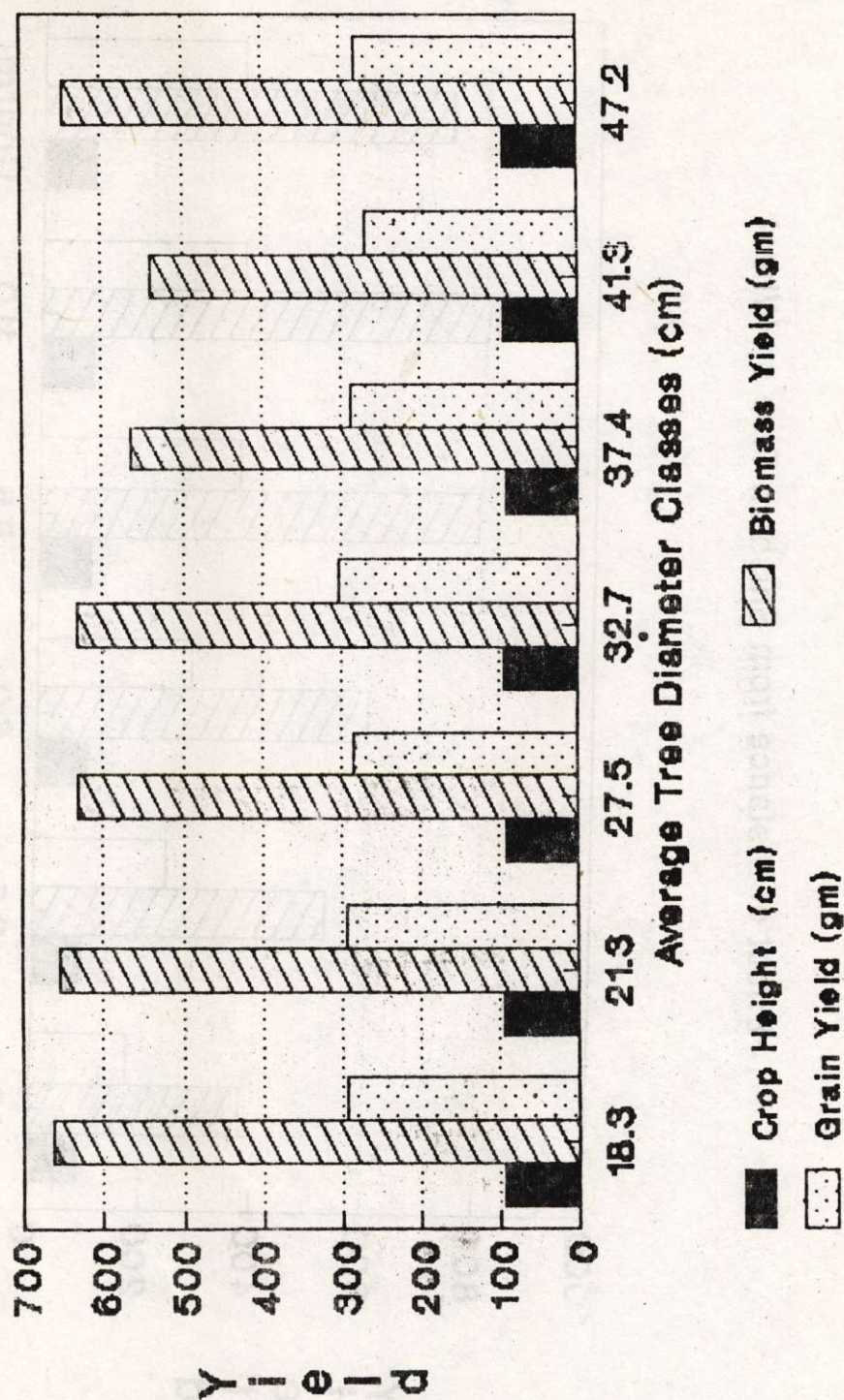
Table 1. Effect of distance From Tree on Wheat Crop Height, Biomass and Grain Yield

Distance from tree	Average crop height (cm)	Average biomass yield (gm)	Average grain yield (gm)
1.0	91.0	380.2	173.5
3.5	92.4	524.2	236.7
6.0	94.1	598.1	275.7
8.5	95.2	790.9	360.8
11.0	95.6	804.4	366.3
Control	95.5	740.7	362.2

Table 2. Effect of tree size on height of Wheat Crop, Biomass Yield, Grain Yield

Average of tree diameter in various classes (cm)	Average crop height (cm)	Average biomass yield (gm)	Average grain yield (gm)
18.3	94.2	663.4	293.2
21.3	94.3	654.5	293.4
27.5	92.6	633.1	284.7
32.7	94.2	633.1	304.2
37.4	92.6	565.3	287.6
41.3	94.3	539.3	269.9
47.2	93.6	648.3	282.4

Effect of Shisham Tree size on Wheat Crop



Effect of Distance from Shisham Tree on Wheat

