

EFFECT OF POPLARS ON THE YIELD OF WHEAT AT CHANGA MANGA IRRIGATED PLANTATION

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Summary

Assessment of yield of wheat at different distances viz. 0.75, 1.75 and 2.75 metres on all the 4 sides of the poplar trees has indicated that the effect of tree shade and competition of trees with wheat crop for water and nutrients at these distances is nonsignificant.

Introduction

To find out the possibility of deleterious effect of trees on the yield of agricultural crops, a study has been conducted in Changa Manga irrigated plantation in 1983. In the study area hybrid poplar had been planted in 1978 at a spacing of 5.5 x 5.5 m over an area of 1.192 ha. Over the period of 4 years the trees have attained an average height and diameter of 15 m and 19 cm respectively.

Methodology

The Sonalika variety of wheat was sown in the second week of February, 1983. The crop was fertilized at the rate of 5 bags of urea/ha. The crop was canal irrigated. The study area was fenced against damage of grazing and wild boar. The methodology adopted for the collection of data is shown in the sketch. Samples of wheat were taken in a square quadrat (0.5 x 0.5 m) on all the 4 sides at the distance of 0.75, 1.75 and 2.75 m from the base of the selected trees. Following attributes were measured and recorded:

- i. Average length of stalk (cms) in a quadrat
- ii. Average length of ears (cms) in a quadrat
- iii. Number of ears in a quadrat
- iv. Number of grains on average bases per ear
- v. Weight of grains (gms) in a quadrat
- vi. Weight of straw (gms) in a quadrat

Averages on 4 sides of sampled tree measurements for distances $D_1 = 0.75$ m, $D_2 = 1.75$ m and $D_3 = 2.75$ m were worked out separately for all the above attributes. The sample trees were considered replications and averages of attributes of three distances D_1 , D_2 and D_3 as treatments for analysis of variance of a randomized complete block design. (Table 1 and Appendices 1-5).

The analysis of the six attributes showed that all the 3 distances (D_1 , D_2 , D_3) had no significant effect amongst them, which indicate that effect of tree shade and competition of

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trees with wheat crop for water and nutrients is nil. Due to difficulty of soil working within about half a metre radius around the tree, germination of wheat was poor. This could be improved by ploughing close to the tree or working the area manually. However, poor germination can not be attributed to the competition of the roots of the poplars, as that part of the root system of the tree which can really exert some influence on water and nutrients is located away and spread all over the field.

Table-1. The average grain yield (gms/0.25 m²) at respective distances on the four sides of a tree.

Tree No.	Distance from the base of tree (m) with yield of grain			
	0.75	1.75	2.75	Total yield
1.	91	83	107	281
2.	89	97	94	280
3.	83	88	76	247
4.	85	80	58	223
5.	54	71	59	184
6.	62	91	83	236
7.	84	77	104	256
8.	68	71	84	223
9.	82	72	65	219
10.	92	86	87	265
11.	84	94	77	253
Total	874	910	894	2,678
Average	79.5	82.7	81.3	81.2

The average yield of grains per 0.25 m² quadrat comes to 81.2 gms. When converted to hectare and acre basis, it is 32.5 quintals per ha/or 35.2 mds. per acre.

The total yield of grains from the study area 1.192 hectares (2.9445 acres) is reported 3400 kg. (85 x 40). Since the effective area of wheat crop excluding blank spaces is 1.15 hectares (2.84 acres), the average yield turned out to be 2957 kg per hectare (32.1 md per acre). The difference in the two yields can be attributed mostly to blank around the trees where the seed did not germinate due to non working of the soil and partly to sampling error.

Conclusion

It is quite clearly indicated that the 4 year old poplars planted at 5.5 x 5.5 m did not

depress grain or straw yields within the rows and the practice could be safely adopted by the farmers in the country. Wood from multipurpose poplar trees would be a bonus and more than offset the loss in agricultural crops, if any, when grown alongwith trees.

Appendix — 1

Average length of stalk (in cms) on 4 sides of sample tree in (0.5 x 0.5 m) quadrats of wheat crop for different distances from base of trees.

Replications	Treatments			Replica- tions/totals
	D ₁	D ₂	D ₃	
I	92	86	87	265
II	86	90	89	265
III	81	84	83	248
IV	84	82	86	252
V	83	81	83	247
VI	80	84	82	246
VII	84	90	85	259
VIII	76	84	83	243
IX	76	77	75	228
X	81	81	82	244
XI	83	85	88	256
Treatment				
total	906	924	923	2,753
Means	82.4	84.0	83.9	

Appendix—2

Average length of ears (in cms) on 4 sides of sample tree in (0.5 x 0.5 m) quadrats of wheat crop for different distances from base of trees.

Replications	Treatments			Replica- tions/totals
	D ₁	D ₂	D ₃	
I	8.1	8.0	7.8	23.9
II	8.1	9.0	8.5	25.6
III	8.4	8.6	9.4	26.4
IV	8.1	8.1	8.0	24.2
V	8.0	8.5	8.0	24.5
VI	8.8	9.1	9.3	27.2
VII	8.6	8.9	9.3	26.8
VIII	8.8	9.4	8.0	26.2
IX	8.3	8.1	7.8	24.2
X	8.0	8.0	8.1	24.1
XI	8.4	8.6	8.1	25.1
Treatment				
Totals	91.6	94.6	92.3	278.2
Means	8.3	8.6	8.4	

Appendix - 3

Average number of ears on 4 sides of sample tree in (0.5 x 0.5 m) quadrats of wheat crop for different distances from base of trees.

Treatments				
Replications	D ₁	D ₂	D ₃	Replica- tions/totals
I	103	77	104	284
II	107	109	85	301
III	89	85	79	253
IV	86	67	63	216
V	60	75	64	199
VI	64	77	76	217
VII	77	86	98	261
VIII	75	80	85	240
IX	77	68	64	209
X	85	80	78	243
XI	69	76	74	219
Treatments				
totals	892	880	870	2,642
Means	81.1	80.0	79.1	

Appendix - 4

Average number of grains on average bases per ear on 4 sides of sample tree in (0.5 x 0.5 m) quadrats of wheat crop for different distances from base of trees.

Treatments				
Replications	D ₁	D ₂	D ₃	Replica- tions/totals
I	43	40	40	123
II	41	44	42	127
III	45	46	50	141
IV	41	43	42	126
V	44	47	44	135
VI	46	48	50	144
VII	46	45	49	140
VIII	42	48	40	130
IX	44	41	40	125
X	43	43	42	128
XI	44	44	40	128
Treatment				
totals	479	489	479	1,447
Means	43.5	44.5	43.5	

Appendix - 5

Average weight of straw (gms) on 4 sides of sample tree in (0.5 x 0.5 m) quadrats of wheat crop for different distances from base of trees.

Treatments				
Replications	D ₁	D ₂	D ₃	Replica- tions/totals
I	237	196	212	645
II	238	237	200	675
III	224	191	202	617
IV	199	170	134	503
V	128	146	136	410
VI	121	179	170	470
VII	161	188	214	563
VIII	157	168	173	498
IX	186	143	151	480
X	158	159	172	489
XI	144	143	160	447
Treatment				
totals	1,953	1,920	1,924	5,797
Means	177.5	174.5	174.9	