

EFFECT OF SHELTERBELTS ON YIELD OF WHEAT CROP IN MASTUNG VALLEY (BALUCHISTAN)

by

S. Rehman*

Abstract. *An experiment was carried out at Mastung to study the effects of one, two and three row shelterbelts (Tamarix gallica, Tamarix gallica + Arundo donax, Tamarix gallica + Arundo danax + Colligonum polygonoides respectively) on yield of wheat crop. For this purpose shelterbelts were raised and wheat crop was sown in the area covered by the belts. All treatments increased yield significantly. Three and two rows were superior to one. Soil moisture in the 0-6 inch layer in plots protected by the belts was consistently higher than in the unprotected plots.*

Description of the tract. Mastung valley is situated in Kalat Civil Division of Baluchistan from 1615 to 1830 m elevation. Its latitude is 29° to 30° North and longitude 66°-45' to 66°-55' East. The meteorological data for the period from July 1968 to June 1969 is given below:

Month	Mean temperature C°		Average rainfall (cm)	Average wind velocity km/hour	
	max	min		(1-12 hours)	(12-24 hours)
July 1968	36.0	20.4	1.3	16.7	44.5
August	33.3	16.1	0.6	9.3	40.8
September	31.6	12.1	0	10.2	29.7
October	19.4	2.8	0	18.3	25.6
November	18.7	1.7	0	12.6	18.3
December	1.7	0.6	6.9	18.3	18.3
January 1969	4.4	3.3	5.5	16.7	18.3
February	0.6	2.8	8.5	16.7	25.6
March	11.6	3.3	1.5	22.0	18.3
April	22.6	6.1	0.2	9.3	14.8
May	25.9	8.3	3.1	11.1	25.9
June	33.5	12.6	0	12.1	15.3

Due to destruction of natural vegetation, the area is undergoing progressive desiccation and mobile sand dunes are burying habitations, roads and agricultural fields.

* Soil Conservation Wing, Baluchistan Forest Departmet, Mastung.

1. Source observatory of Pakistan Meteorological Department at Pashkaram Farm, Mastung.

Description of the experiment. The following kinds of shelterbelts were grown over 85 acres in this area at right angles to the prevailing wind direction:

1 row	<i>Tamarix gallica</i>
2 rows	<i>T. gallica, Arundo donax</i>
3 rows	<i>T. gallica, Arundo donax, Colligonum polygonoides.</i>

Out of 85 acres 5.5 acres were selected for this experiment. The belts were raised leaving a distance of 70' in between the belts for growing of the crop. The experiment was laid out in the randomized complete block design. The belts, which were five feet wide for each species and were at right angle to the predominant winds direction, were regularised by uniform pruning into desired shape during the winter season of 1967-68.

The experimental fields were irrigated by karez water, alongwith the shelterbelt plants on 30 August, 1968. On September 10, all the fields were ploughed twice by bullock drawn country plough, weeds were removed and proper shape was given to the plots. Local wheat was sown on the same day at seed rate of 25 seer/acre in all the plots. The same pair of bullocks, implements and operator were employed for all this process. For sowing in lines, a locally made seed drill was used attached with the plough. After sowing the fields were subjected to planer.

Germination was completed by 15th of October. Since no rainfall was received from August to November the fields were irrigated on 20th November. The shelterbelts were also irrigated by running water through the rows. No other treatment was given to the fields except looking after, till the last week of April, 1968 when the crop now in jointing and tassel stage, was irrigated for the third and the last time.

The wheat crop matured in the last week of June and was ready for harvest. Harvesting was done by human labour. The harvested wheat crop from each plot was kept and threshed separately. The final grain yield was then carefully weighed and recorded.

During the course of investigation, ten random soil samples were taken from each plot from 0-6 inch depth in October, December, February and May and their percent moisture determined.

Results and discussion. Effect on yield: The grain yields obtained from each plot of 70' x 50 ft. under the different treatments are given below:

Replication	Control	One row	Two rows	Three rows
1	66.4	69.1	75.2	72.3
2	67.2	70.4	73.6	73.8
3	64.0	74.0	74.8	74.4
4	60.8	70.8	75.2	73.6
5	66.4	67.6	76.0	74.0
Total	324.8	351.9	374.8	368.1
Mean	65	70	75	74

Two and three row wide shelterbelts caused a highly significant increase in the yield of wheat as compared to the control. The yields from one row shelterbelt were significantly higher than that from control. There was no significant difference in the yields of 2 and 3 row belts. Both these were significantly higher than the yields from one row belts.

Effect on soil moisture: As is evident from the following data, the soil moisture in the plots protected by belts was consistently higher in the 0-6 inch depth as compared to the control.

Number of rows	October	December %	February moisture	May
1	15.2	16.0	18.0	18.0
2	15.1	16.1	18.3	19.0
3	15.8	16.2	18.4	19.5
Control	12.3	12.3	14.7	14.7

Literature Cited

1. BATES, G. 1945. Shelterbelts Influence. General description of studies made. Jour. of Forestry, Vol. 43: 88-92. (U.S.A.)
2. ———— 1945. Shelterbelts Influence. The value of shelterbelts for house heating. Jour. of Forestry, Vol. 43: 176-96. (U.S.A.)
3. CHEPIL, S.W. and MILINE, R.A. 1941. Wind erosion of soil in relation to the size and nature of the exposed area. Sci. Agric. USDA 21: 479-487.
4. CALL, L.E. 1936. Cultural Methods of controlling wind erosion. Amer. Sci. Agric. Jour. 28: 193-201.
5. EDMINISTER, F.C. 1949. Streambank Training for erosion control in North East. USDA Leaflet No. 258.
6. GEORGE, L.J. 1960. Effect of shelterbelts upon crop yield. A paper presented to 5th World Forestry Congress, Seattle, Washington (August-September 1960). Pp. 14-20.
7. MIRZA M.A. Raising shelterbelts. Soil Conservation Sand Dune Stabilization at Mastung. (Unpublished).
8. SHARIF, M. 1957. Mastung Sand Dune, their formation and control. A paper presented to Symposium of Soil Erosion and its control in Arid Zone at Karachi under UNESCO. p. 1-15.
9. WOODRUFF, N.P. and ZINGG, A.W. 1952. Wind tunnel studies of fundamental problems related to wind breaks. USDA. SCS. T.P. 112.