EFFECT OF FREQUENCY OF WATERING ON THE SURVIVAL AND GROWTH OF FODDER TREES

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Summary: A study was planted in the Range Research Nursery to determine the effect of 5 watering frequencies namely weekly, 2-weekly, 3-weekly, 4-weekly and no watering on 4 fodder species viz. *Leucaenea leucocephala, Robinia pseudocacia, Ceretonia siliqua* and *Tecoma undulata* during July, 1982. By November, 1982 it was found that species differ appreciably in the survival percentage as well as the average height of survived plants. The irrigation frequencies had a differential effect on the biomass production of leucaenea and the height of trees but not on their survival percentage. *Leucaenea leucocephala*, had a much more survival, height and biomass than all other species. Robinia did not do well under low or no irrigation and Tecoma did as good without irrigation as with irrigation. Leucaenea and Tecoma can grow without irrigation at Peshawar, while Leucaenea is benefitted with irrigation, Tecoma is not.

Introduction: Water is a limiting factor in the arid and semi-arid areas of Pakistan. In these areas, whenever some water is available, it should be judiciously utilized. It is the general practice that all tree species grown in these areas are given the same frequency of watering depending upon the availability of water and labour. In order to optimise the use of water for growing fodder trees, an experiment was laid out in the Range Research Nursery, Pakistan Forest Institute, Peshawar to find out the effect of frequency of watering on the survival and growth of 4 fodder tree species.

Study Area: The climate is hot subtropical semi-arid continental. The 16 years (1967–1982) average monthly minimum temperature, maximum temperature, rainfall and relative humidity recorded at Pakistan Forest Institute, Peshawar (the same place) are given in Appendix-I and the rainfall at Pakistan Forest Institute for the study period is given in Appendix–II.

Methodology: Four fodder tree species namely *Leucaenea leucocephala, Robinia pseudocacia, Ceretonia siliqua*, and *Tecoma undulata* were planted in a split plot design with 4 frequencies of watering viz. weekly, 2-weekly, 3-weekly, 4-weekly and no watering as the first split and species as the second split. The plant to plant and row to row distance was kept at about 3 metres. The total number of plants in each row were 28. The planting was done on 25.7.1981. The watering was done upto the end of November, 1981 and stopped for the winter month of December, January and February. This was again resumed during March, 1982 and is continuing till to-date.

The number of trees of each species surviving in November, 1982 were counted and survival percentage worked out. The height from ground level to the tip of the leading shoot was measured for each tree and averaged out for each replication and treatment. The biomass of 9 randomly selected trees of iple iple from each replication and treatment was determined by weighing all wood and foliage after cutting the trees at 15 cms from the ground level.

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Results: The average survival of the various fodder species under different watering frequencies are given below:

SURVIVAL OUT OF 28 PLANTS

Irrigation	Leucaenea leucocephala	Robinia pseudocacia	Ceratonia siliqua	Tecoma undulata
Weekly	28	23	25	18
2–weekly	28	18	25	25
3–weekly	27	19	25	27
4–weekly	25	19	26	28
No irrigation	28	6	22	28
Average for the species	27	17	25	25

The above data show that there was no significant difference between the survival of plants with different irrigations. However the survival of *Robinia pseudocacia* decreased with the increase in the period after which watering is done. This showed that *Robinia pseudocacia* will not grow well without irrigation at Peshawar (Average annual rainfall 35 cm).

The average height of the survived plants of various fodder species under different irrigation frequencies are given below:

AVERAGE HEIGHT (CM)

Irrigation	Leucaenea leucocephala	Robinia pseudocacia	Ceratonia siliqua	Tecoma undulata
Weekly	371	110	142	100
2–weekly	332	103	123	157
3–weekly	320	85	120	155
4–weekly	294	86	118	146
No irrigation	267	77	109	141
Average for the species	317	92	122	140

The above data show that there was appreciable difference of height of trees between different species and also between irrigation frequencies. *Leucaenea leucocephala* has out-grown all other species, and its height is more than double of the others. In fact, the total biomass production of iple iple would be at least 10 times that of any other species. This shows that iple iple is a very suitable species for growing at Peshawar.

There was also significant difference between the height of plants in different irrigation frequencies. The weekly irrigation gave much more height than all other irrigation treatments. This was especially true in case of iple iple which had a much greater average height in weekly irrigations that all other irrigation treatments. The total biomass production per tree per year of iple iple in weekly irrigation treatment was 7.80 kg which was 6 times that of control (1.3 kg) and more than double of any other irrigation treatment (3.25 kg in 2–weekly irrigation 2.25 kg

in 3–weekly irrigation and 2.09 kg in 4–weekly irrigation). However iple iple can also be grown without irrigation at Peshawar as it had an average height of about 110 cm in control treatment.

Tecoma undulata, which is a species of arid zone, however did not show any difference due to different irrigation frequencies. It will, therefore, be wise to grow it under dry conditions only and not waste valuable water on it.

Appendix – I Meteorological data of Pakistan Forest Institute, Peshawar (Av: 1967 – 1982)

Month	Temperature C° Max	Min	Rainfall (mm)	Humidity (%)
January,	17	2	22	70
February,	18	4	45	67
March,	23	10	80	65
April	30	15	36	56
May	34	19	20	43
June	39	24	12	48
July	37	26	38	67
August	34	25	60	70
September	34	21	15	62
October	30	14	5	55
November	25	7	13	59
December	20	3	18	69

Appendix – II Rainfall in Peshawar:

July, 1981 (last 6 days)	=	18 mm.
August, 1981	=	91
September, 1981	=	0
October, 1981	=	16
November, 1981	=	5
December, 1981	=	0
January, 1982	=	19
February, 1982	=	24
March, 1982	=	92
April, 1982	=	16
May, 1982	=	6
June, 1982	=	0
July, 1982	=	11
August, 982	=	123
September, 1982	=	9
October, 1982	=	0
November, 1982 (First 16 days).	=	52
	Total	482 mm. in 479 days