SURVIVAL AND GROWTH OF *EUCALYPTUS CAMALDULENSIS* AND *CERATONIA SILIQUA* IN PAKISTAN

by

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Abstract. *One year old Eucalyptus camaldulensis, Ceratonia siliqua and Zizyphus mauritiana raised in polythene tubes were planted on* 18-2-1975 *in deep alluvial clay loam soil at Peshawar and each plant irrigated with four gallons of water at planting. The rainfall during* 1975 *and* 1976 *was* 439 *and* 554 *mm respectively (annual average* 377 *mm). On* 5-1-1977 *the survival of E. camaldulensis was* 97% *against* 52 *for Z. mauritiana and* 53 *for* C. *siliqua. The mean height of E. camaldulensis was* 5 *m and mean diameter* 5 *cm.*

Throughout Pakistan more trees are needed for amenity, and for producing wood and fodder. Since the climate is dry and water is scarce, trees selected for planting must be drought resistant. To find such trees, an experiment was started in the Pakistan Forest Institute in 1975 to compare the survival and growth of *Eucalyptus camaldulensis* and *Ceratonia siliqua* with the indigenous *Zizyphus mauritiana.* The experimental area is representative of Qazi S. Ahmad's (1) sub-tropical highlands semi-arid zone. Mean annual rainfall is 377 mm. Rainfall and temperature averages for the past ten years are as follows:

Month	Evaporation (mm)	Rainfall (mm)	Number of rainy days	Temperature, C° Mean Max.	Mean Min.
January	50	15	3	17.3	2.3
February	62	47	6	18.2	4.7
March	109	72	7	23.6	9.6
April	209	41	5	29.6	14.6
May	257	25	4	34.5	19.2
June	308	14	1	39.4	24.0
July	261	28	4	36.9	25.5
August	200	74	5	34.6	25.1
September	171	24	3	33.4	20.8
October	127	8	2	30.1	13.2
November	73	15	1	24.7	6.5
December	43	14	3	19.5	3.1
Total:	1870	377	44		

Method. The experiment was planted in a split-split plot design with soil working to 30 and 60 cm. depths as the first split, and the following treatments as the second split:

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Shallow-planting (collar at ground level) with pebble mulch; shallow planting without mulch; deep planting (collar 30 cm below ground level) with pebble mulch; deep planting without pebble mulch.

Each treatment was given to a group of three seedlings of each species, one year old, raised in polythene tubes. The planting was done on 18-2-1975. Each plant was given 4 gallons of water at planting. The following rainfall was received subsequent to planting:

Month	1975	1976
	(mm)	
March	91	58
April	18	62
May	53	—
June	1.5	10
July	67	29
August	150	272
September	9	20
October	—	7
November	—	—
December	6	—
January	0.5	12
February	43	84
Total	439	554

Results and discussion. The experiment was assessed on 5-1-1977. Depth of working (30 and 60 cm) did not significantly influence either survival or growth. *Eucalyptus camaldulensis* survived significantly better (1% level) as compared to the other two species as indicated below:

Replication	Number of surviving plants out of 24 planted		
	E. camaldulensis	*Z. mauritiana*	*Ceratonia siliqua*
1	23	9	12
2	23	14	13
3	24	14	13

Survival of *Z. mauritiana* and *C. siliqua* was about the same.

Survival of *E. camaldulensis* was equally good in all the combinations of depth of planting and mulching:

	Number of plants surviving out of 6 planted			
	Shallow planting, mulching	Shallow planting, no mulch	Deep planting mulching	Deep planting. no mulch
R_1	5	6	6	6
R_2	6	5	6	6
R_3	6	6	6	6
Total:	17	17	18	18

Survival of *Z. mauritiana* and *C. siliqua* was significantly better (5% level) with deep planting plus mulching as compared to shallow planting and no mulching. Other treatment comparisons were not significantly different:

	Number of plants surviving out of 6 planted			
	Shallow planting, mulching	Shallow planting, no mulch	Deep planting, mulching	Deep planting no mulch
		Z. mauritiana		
R_1	2	1	5	1
R_2	4	4	3	3
R_3	3	1	6	4
Total:	9	6	14	8
		C. siliqua		
R_1	1	1	5	5
R_2	3	4	4	2
R_3	4	1	5	3
Total:	8	6	14	10

None of the treatments significantly influenced height or diameter in any of the species. These were as follows:

Species	Number of observations	Mean height (m)	S.E. (m)	Mean diameter (cm)	S.E. (m)
E. camaldulensis	70	4.97	0.17		
	61			4.95	0.18
Z mauritiana	37	2.59	0.14		
C. siliqua	38	1.12	0.07		

Conclusion. The investigation indicates the possibility of growing *E. camaldulensis* and *C. siliqua* under rainfed conditions in the semi-arid zone of Pakistan where soils are deep.