

Agronomy: Rainfall and Irrigation

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Jatropha is the crop for dry area it handles dryness very well and it is possible to live almost entirely of humidity in the air. Differences are expressed in what is optimum rainfall as some readings say 600 mm and some say 800 mm whilst some areas in India report good crops with rainfall of 1380 mm. Under irrigation 1 500 mm is given. 500 - 600 mm of rainfall is the limit. Below it the production depends on the local water condition in the ground.

It will also stand for long periods without water - up to 2 years – and then grow again when rains occur again.

For large scale Jatropha plantation in dry area, plant must be grown in the nursery with optimum input material and proper irrigation. After 3.5 to 4 month old well nursed plant should be transferred on the field in proper pit size and optimum manure quantity depending upon the soil conditions and planting period of the plantation. Freshly planted seedlings require irrigation especially during the first 2-3 months for good survival.

The requirement of water is contingent upon local soil and climatic conditions. The stage of fertigation should be matched with the time of irrigation. During the dry period, the life saving irrigation may be given with time interval depending on the requirement.

The critical stages of irrigation (viz. transplanting, dry spell during summer in first year of plantation for survival in rainfed areas, flowering to control sex switching and promote anther dehiscence) and frequency for irrigation were worked out to economize water application. The appropriate mulching method is also the best method to restore moisture content in the soil. Soon after plantation, irrigation followed by laying of newspaper and dry straw around plant has been found very effective for the initial establishment of saplings. Any material locally used, as mulch will help to conserve moisture for establishment of saplings.

Irrigation and water requirement depends upon the climatic conditions and open pan evaporation rate in the area.

Calculation were done on the water requirement for jatropha plants through out the year.

Below shown water requirement were done for Barmer district of Rajasthan, this district is highly dry and low

humidity area. Calculated water requirement shown in below given table can be considered as a higher site water requirement by the plant due to most dry field.

Water requirement

Name of The plant	Jatropha curcas
Plantation distance	2mtX2mt
No. of Plant per Hectare	2500

Water Requirement (WR)= AXBXCXDXE

A=Open pan evaporation(mm/day)

B=Pan factor(0.7)

C=Spacing of Crop plant(Sqmt)

D=Crop factor(Factor depends upon plant growth for fully grown plants=1)

E=Wetted Area(0.3 for widely spaced plantation and 0.7 for closely spaced plantation)

Month-wise Mean Evaporation of Barmer Distric (Station Index 42435) (In mm)

Month	Mean Evaporation
January	4
February	4.2
Mar	5
Apr	6.2
May	6.8
June	6.7
Jul	6.4
Aug	6.4
Sept	6.6
Oct	7.1
Nov	5.7
Dec	4.8

Estimation of water requirement

Month	mm	Mm/Day	Pan factor	Plant spacing	Crop factor	Wetted area	WR(Ltr/day)	WR/hect	WR/hect
		A	B	C	D	E		(Ltr/day)	(Ltr/month)
January	124	4	0.7	4	1	0.7	7.84	19600	607600
February	121.8	4.2	0.7	4	1	0.7	8.232	20580	596820
March	155	5	0.7	4	1	0.7	9.8	24500	759500
April	186	6.2	0.7	4	1	0.7	12.152	30380	911400
May	210.8	6.8	0.7	4	1	0.7	13.328	33320	1032920
June	201	6.7	0.7	4	1	0.7	13.132	32830	984900
July	172.8	6.4	0.7	4	1	0.7	12.544	31360	846720
August	198.4	6.4	0.7	4	1	0.7	12.544	31360	972160
September	198	6.6	0.7	4	1	0.7	12.936	32340	970200

October	220.1	7.1	0.7	4	1	0.7	13.916	34790	1078490
November	171	5.7	0.7	4	1	0.7	11.172	27930	837900
December	148.8	4.8	0.7	4	1	0.7	9.408	23520	729120
Total	2107.7	69.9	8.4	48	12	8.4	137.004	342510	10327730

Therefore, The maximum requirement of water were 14 ltr/day/plant during the month of October, for this the water requirement works out to 34.79 Cub mtr/day/for one hectare plantation.

Irrigation frequency

Based on above calculations irrigation frequency were set for optimum growth of Jatropha plantation and proper management of irrigation water.

Month	Irrigation frequency (In days interval)	Number of irrigation/Year
January	20	18
February	18	20
Mar	15	24
Apr	7	52
May	7	52
June	7	52
Jul	8	45
Aug	8	45
Sept	8	45
Oct	7	52
Nov	10	36
Dec	15	24

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FACT Comments on article:

- Has any research been done on the quantification of the yield response to irrigation?
- **Field saturation of the soil?**
- **Do you have a soil humidity curve comparison with the rainfall registry?**

Application: 1 Choice: Agronomy Rainfall and Irrigation; 2 Choice: Other issues
