



FRUIT GROWTH STUDIES IN *JATROPHA CURCAS* UNDER TROPICAL CONDITIONS OF MHOW (M.P.), INDIA

Ranjit Singh and Mohammed Nasim

Defence Institute of Bio Energy Research, Haldwani, Distt-Nainital (Uttarakhand), India.

Abstract

Jatropha curcas is an oil yielding stress tolerant plant with highly variable seed yield. *Jatropha* is an indeterminate plant with having all stages of the fruit growth (immature to mature ripe fruit) found at one time. This study revealed that it takes 11 weeks from fruit setting to its maturity. Fruit length of mature fruit ranges from 29.60 to 36.01mm and fruit width ranges from 25.09 to 32.35mm. Fruit colour changes from light green to dark green than yellow and finally brown-black on drying. A normal *Jatropha* fruit takes 75 to 80 days from fruit setting to its maturity. Flowering begins in May and continues till end of May and fruit sets in June-July and get ready for harvesting in Aug.-Sept. as per the setting time due to its indeterminate nature, under tropical conditions of Mhow (M.P.), India.

Key words : Fruit length, fruit width, indeterminate, harvesting, Mhow.

Introduction

Jatropha curcas is an oil yielding plant of family *Euphorbiaceae*, with highly variable seed yield (50g to 3.0 kg). It is drought resistant oil yielding shrub or tree widely distributed in central and South America, Africa, India and south East Asia (Cano-Asseleih, 1986, Cano-asseleih *et al.*, 1989). It grows well in tropics and subtropics (Fairless, 2007; Carels, 2009; Makkar & Becker, 2009).



***Jatropha* Plantation**

The plant is monoecious and flowers are unisexual, occasionally hermaphrodite flower also occurs (Dehgan & Webster, 1979). There is a huge variation in seed yield

of this plant. It varies from 0.1 to 15 tonnes/ha/year (Ouwens *et al.*, 2007). Different researchers have reported different amount of oil content ranging from 24% to 60% (Liberalino *et al.*, 1988; Gandhi *et al.*, 1995; Sharma *et al.*, 1997; Wink *et al.*, 1997; Makkar *et al.*, 1997; Openshaw, 2000). Fruit growth studies are lacking in *Jatropha*. Each *Jatropha* inflorescence is composed of 100-300 flowers and yields approximately 10 or more ovoid fruits (Kumar and Sharma, 2008). This study was undertaken to through some light on fruit growth and development aspect of *Jatropha curcas*.

Materials and Methods

The study was undertaken at DIBER Bio-fuel Park at Mhow (MP) to study the fruit growth since its inception to maturity. Fruit length and width were measured with measurement of fruit length & width with vernier callipers digital vernier callipers regularly at weekly intervals for continuous 13 weeks from fruit setting to the complete maturity of the fruit when it turns brown-black.



Measurement of fruit length & width with vernier callipers

Results and Discussion

Jatropha is a monoecious plant with male and female flowers occurring on the same plant. Each bunch generally having 25:1 male and female flower ratio. Each fruit bunch generally having 4-10 fruits (fig. 1). Fruit growth data was taken weekly which indicated that during first and second week of fruit setting growth occurs very fast then it slow down for next two weeks. Fruit growth again gets momentum in 6th and 7th week. The entire growth data of *Jatropha* fruits from fruit setting to its maturity is given below in the table 1 and fruit growth trend is also clearly visible in figs. 2 and 3.



Fig. 1 : Young *Jatropha* fruit mature fruit data recording of fruit.



Fig. 2 : *Jatropha* fruits in different growth stages.

Table 1 : Fruit growth pattern up to 13 weeks in *Jatropha curcas*.

Weeks	Length (mm)	Width (mm)
1	2.34	1.23
2	8.34	6.60
3	11.64	6.82
4	11.81	8.14
5	19.17	11.36
6	25.97	22.82
7	27.26	24.11
8	29.60	25.09
9	31.76	30.48
10	37.34	31.29
11	37.39	32.91
12	34.01	32.21
13	26.45	22.69

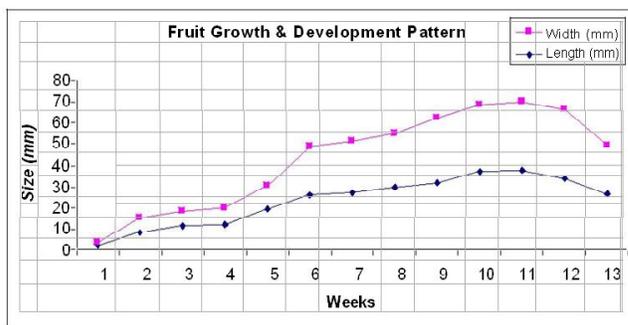


Fig. 3 : Graphical representation of fruit growth and development pattern.

Clear idea about the fruit growth and development and the time taken for complete fruit growth is needed by the researchers for formulating the research and development programmes regarding *Jatropha curcas*. This study through light on the time taken from fruit setting to maturity of *Jatropha* fruits. It also describes the range of fruit length and width. This data will be very helpful in trials formulation for plant growth regulators spray timing and duration. It will be also helpful in the planning of harvesting in the *Jatropha* plantations.

References

Cano-Asseleih, L. M. (1986). Chemical investigation of *Jatropha curcas* L. seeds. *Ph.D. Thesis*. University of London, UK.

Cano-asseleih, L. M., R. A. Plumbly and P. J. Hylands (1989). Purification and partial characterisation of the hemagglutination from seeds of *Jatropha curcas*. *Journal of Food Biochemistry*, **13** : 1-20.

Carels, N. (2009). *Jatropha curcas* : A review. In: Kader J C & Delseny M (eds). *Advances in Botanical Research*. Academic Press, NewYork. 39-86.

Dehgan, B. and G. L. Webster (1979). Morphology and Intrageneric relationships of the genus *Jatropha* (Euphorbiaceae), Vol. **74**. University of California Publications in Botany.

Fairless, D. (2007). The little shrub that could-may be. *Nature*, **449** : 652-655.

Heller, J. (1996). Physic nut *Jatropha curcas* L. Promoting the conservation and use of underutilised and neglected crops. International Plant Genetic Resources Institute, Rome. I Getersleben.

Kumar, A. and S. Sharma (2008). An Evaluation of multipurpose oil seed crop for Industrial uses (*Jatropha curcas* L) : A review. *Ind. Crops Prod.* : 1-10.

Liberalino, A. A., E. A. Bambirra, T. Moraes-Santos and E. C. Viera (1988). *Jatropha curcas* L. seeds : Chemical analysis and Toxicity. *Arq. Biol. Technol.*, **31** : 539-550.

Makkar, H. P. S., K. Becker, B. Schmoock, F. Sporer and M. Wink (1997). Studies on nutritive potential and toxic constituents

- of different provenances of *Jatropha curcas*. *J. Agric. Food Chem.*, **45** : 3152-3157.
- Openshaw, K. (2000). A review of *Jatropha curcas*: an oil plant of unfulfilled promise. *Biomass Bioenergy*, **19** : 1-15.
- Ouwens, D. K., G. Francis, Y. J. Franken, Rijssenbeek, W. A. Riedacker, N. Foidl, R. Jongschaap and P. Bindraban (2007). Position paper on *Jatropha curcas*. State of the art, small and large scale project development. Factundation, URL:http://www.factfuels.org/en/FACT_knowledge_centre/FACT_Publications.
- Sharma, G. D., S. N. Gupta and M. Khabiruddind (1997). Cultivation of *Jatropha curcas* as a future source of hydrocarbon and other Industrial products. In: Gubitz, G.M., Mittelbach, M., Trabi, M (Eds), Biofuels and Industrial Products from *Jatropha curcas*. DBV Graz. 19-21.
- Wink, M., C. Koschmieder, M. Sauerwein and F. Sporer (1997). Phorbol esters of *J. curcas*-biological activities and potential applications. In: Gubitz, G.M., Mittelbach, M., Trabi, M. (Eds), Biofuels and Industrial Products from *Jatropha curcas*. DBV Graz. 160-166.