RESEARCH ARTICLE

Study of Fruit, Seed and Embryo In *Tecoma Stans* (Linn.) H.B. & K. Nov. Gen

Labhane NM[1] and Dongarwar NM[2]

[1]*Department of Botany, Bhavan's College, Andheri-W, Mumbai-58*

[2]*Department of Botany, RTM Nagpur University campus, Nagpur-33*

Email- nlabhane@yahoo.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Labhane NM and Dongarwar NM (2014) Study Of Fruit, Seed and Embryo In *Tecoma Stans* (Linn.) H.B. & K. Nov. Gen, *Int. J. of Life Sciences,* Special Issue A2: 135-138

Acknowledgement:
Authors thank Prof. K.H. Makde for his critical guidance. First author is thankful to Dr. VI Katchi, Principal, Bhavan's College, Andheri for constant encouragement.

Copyright: © Author(s), This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

ABSTRACT

Tecoma stans (Linn.)H.B. & K. Nov. Gen is a species of flowering perennial shrub belonging to family Tecomaceae, and is native to South America. *Tecoma stans* is medicinally important since different plant parts have nephrotoxic, antifungal and antibacterial properties. The flowers arise in condensed raceme with bright yellow colour flowers. Each ovary contains many ovules. The fruit are elongated and compressed with about 11-20 cm, with two sections each containing about 10-20 seed in each locule. Seeds are non endospermic, with seed coat showing papery appearance. The structure of embryo is very distinct. In most of the angiosperms, the two cotyledons are mostly folded, and thus prevent the exposure of the growing tips to outer environmental conditions. However in *Tecoma stans* it is found that the two cotyledons are unfolded, which leads to exposure of the plumule and the radical. The shape of the embryo seems to be very characteristic, adapting itself to be dispersed at longer distances. The embryo also seems to have evolved in order to orient itself according to the shape of the seed for longer distance dispersal. However the structure of the embryo seems to have detrimental effect on the survival of the species in xeric condition, since the plumule is not having the said protection which is normally seen in case of many angiosperms.

Key words – Seed, embryo, non-endospermic, abortion.

INTRODUCTION

The reproductive capacity or potential of plants is a very critical aspect of plant reproduction, which depends on the structure of fruit, seed and the embryo. Reproductive capacity of many plants is extremely great and that there are large differences between species. These differences may be the result of different selective pressures and are related to the ability of a species to persist in time and in space (Harper and White, 1974). Reproductive strategy may also affect the ability of a species to colonize vacant habitat and thus may be an important determinant of meta-population dynamics (Pannell and Barrett 1998). As a result, there has been much interest in how variation in reproductive mode affects geographical distribution and the capacity for range expansion, which in the extreme case is manifested as biological invasion (Pysek, 1997).

Tecoma stans (Linn.) H.B. & K. Nov. Gen is a species of flowering perennial shrub belonging to family Tecomaceae (which was placed earlier in family Bignoniaceae), and is native to South America. The flowers arise in terminal raceme with bright yellow colour flowers. Each ovary contains many ovules.

The fruit are elongated and compressed. The importance of the fruit, seed and embryo has been emphasized by several authors with respect to the perpetuation of the species (Korkutal, 2005; Labhane and Dongarwar, 2012). The present paper deals with the study of the fruit, seed and embryo with respect to its perpetuation.

MATERIALS AND METHODS

The plant twigs were collected from various parts of Mumbai and Nagpur. The plant was identified with the help of Flora of Maharashtra (Singh et al., 2001). The twigs containing fruits were collected during the end of the growing season, when the fruits were more or less green in coloured but ripe enough to dissect out the seed and the embryo. The dissected fruit, seed and the embryo were observed under dissecting microscope. The viable embryo and the unviable embryos were identified with respect to presence or absence of embryo inside the seed. The unviable seeds contain the underdeveloped and withered embryos.

RESULTS AND DISCUSSION

The fruit size varies from 12-20 cm in length and 0.5 - 0.6 cm in breath. The mature seed is approximately 0.5 cm × 12 cm. The mature embryo dissected is about 0.3 × 0.6 cm. The seeds are non-endospermic. The plants selected in the present investigation were further explored with respect to presence or absence of viable embryos. The number of seeds present in a mature fruit varies from 7-36. The Viable seed are characterised by fully developed fruit, whereas the non viable fruits contains hollow seeds. The viable seed only contains the embryo, whereas the non-viable seeds are devoid of any embryo (Table-1, Plate-1).

The percentage viability is less in Mumbai region as compared to Nagpur. The most probably reason can be attributed to the effect of pollution in metro cities. Pollution seems to have effect on morphology and metabolic phenomena including photosynthesis (Nighat and Mahmooduzzafar, 2000) and carbohydrate accumulation, along with the reproductive capacity of the plant (Salisbury, 1942).

The fruits are categorized as small, medium and large, based on its length. The reproductive capacity of the plant shows great variability, with respect to the size of the fruit namely the small, medium and large fruits.

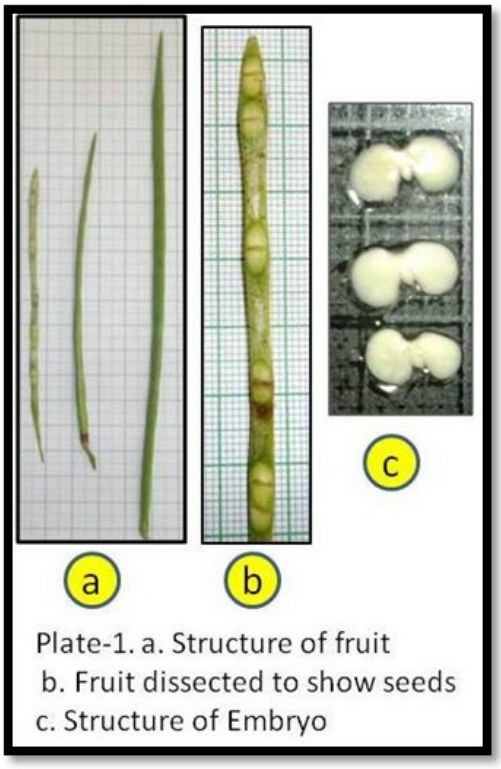

Plate-1. a. Structure of fruit
b. Fruit dissected to show seeds
c. Structure of Embryo

The small as well as the large fruits in most of the cases shows the presence of seeds without any embryo. However the medium size fruits show the more viable number of seeds. The loss of viability in case of larger fruits can be attributed to the absence of well developed or thin testa, non-availability of endosperms and structure of embryo (Table-2, Plate-1). The embryo abortion is also more in case of seed observed from Mumbai region as compared to Nagpur. The embryo abortion in Mumbai region can also be related to pollution since Nagpur is considered as less polluted city as compared to Mumbai. The work on embryo abortion has also been reported in *Asclepias speciosa*, *Oxalis magnifica*, *Epilobium angustifolium*, *Dalbergia sissoo Cynoglossum officinale*, *Schima wallichii*, some Acanthaceae members (Labhane & Dongarwar, 2012) etc. However, the embryo abortion is very common among many fruit plants (Nakamura, 1988).

The structure of embryo is very distinct in case of *T. stans* (Plate-1). In most of the angiosperms, the two cotyledons are mostly folded, and thus prevent the exposure of the growing tips to outer environmental conditions. However in *T. stans* it is found that the two cotyledons are unfolded, which leads to exposure of the plumule and the radical. The structure of embryo shows great variation in morphology (Periasamy, 1990).

Table 1: Showing the number of seeds in each fruit and viability of the seed with respect to the presence or absence of embryo.

Sr. no.	Size of fruit	No. of seed in fruit	Viable /Non-viable seed	Place of collection
1.	Long	36	All are non-viable	Mumbai
2.	Medium	14	All are non-viable	Mumbai
3.	Medium	18	2 non-viable, rest viable	Mumbai
4.	Medium	18	All are viable	Mumbai
5.	Medium	18	3 non-viable, rest viable	Mumbai
6.	Medium	17	All are viable	Mumbai
7.	Small	7	All are non-viable	Mumbai
8.	Medium	18	All are viable	Mumbai
9.	Medium	17	All are viable	Mumbai
10.	Small	7	All are non-viable	Mumbai
Total		**170 (17±8)**	**101 viable/ 69 Non viable**	
1.	Small	**7**	All are non-viable	Nagpur
2.	Small	8	All are non-viable	Nagpur
3.	Medium	16	All are viable	Nagpur
4.	Medium	18	All are viable	Nagpur
5.	Medium	17	All are viable	Nagpur
6.	Small	7	All are non-viable	Nagpur
7.	Medium	18	4 non-viable, rest viable	Nagpur
8.	Long	34	All are non-viable	Nagpur
9.	Medium	17	All are viable	Nagpur
10.	Medium	18	All are viable	Nagpur
Total		**160 (16±8)**	**100 viable/ 60 Non viable**	

(The above table shows the average of number of seeds present in each fruit collected from 10 different plants at each location). The figure in the bracket indicates the mean and its standard deviation.

Table 2: Showing number of seeds in the fruit with abortive and viable embryo

Sr. no.	No. of seeds	No. of embryo	No. of young/ mature embryo	No. of aborted embryo	No. of viable embryo	Place of collection
1.	40	-	All mature	All abortive	Nil	Nagpur
2.	43	-	All mature	All abortive	Nil	Mumbai
3.	24	22	22 mature	2 abortive	22	Mumbai
4.	25	21	21 mature	4 abortive	21	Nagpur
5.	18	18	18 mature	-	18	Nagpur
6.	18	14	14 mature	4 abortive	14	Mumbai
7.	31	30	30 mature	1 abortive	30	Nagpur
8.	42	39	39 mature	3 abortive	39	Mumbai
9.	18	18	18 mature	-	18	Nagpur
10.	18	17	17 mature	1 abortive	17	Nagpur
11.	7	-	-	All abortive	Nil	Mumbai
12.	7	-	-	All abortive	Nil	Nagpur
13	38	-	All mature	All abortive	Nil	Nagpur
14	41	-	All mature	All abortive	Nil	Mumbai
15	26	22	22 mature	4 abortive	22	Mumbai
16	25	22	22 mature	3 abortive	22	Nagpur
17	9	-	-	All abortive	Nil	Mumbai
18	9	-	-	All abortive	Nil	Nagpur
19	31	29	29 mature	2 abortive	29	Nagpur
20	42	38	38 mature	4 abortive	38	Mumbai
TOTAL	**512**	**290**	**290**	**222**	**290**	

(N=20, fruit and seeds from 20 different plants were randomly collected and analyzed for embryo abortion)

CONCLUSION

The structure of the fruit, seed and embryo seems to have detrimental effect on the survival of the species in xeric condition. The seed has been adapted for dispersal for longer distances being papery; however the evolution in the structure of seed seems to have led to the formation of flattened and unfolded embryo exposing both the radicle and the plumule to adversaries of nature. The condition of the seed becomes even more precarious since the seed is devoid of endosperm.

REFERENCES

Dangwal LR Singh A, Singh T Sharma A and Sharma C (2010) Effect of weeds on the yield of wheat crop in Tehsil Nowshera. *J. American Sci.* 6(10):405-407.

Gadpayale JV. Chaturvedi AA (2011) "Wound Healing Plants of Bhandara District of Maharashtra State, India: *Current Botany*: 2(10):01-06ISSN:2220-4822. *Online issue*.

Gadpayale JV, Chaturvedi AA, Khobragade DP, Sathawane, KN (2013) Ethnobotanical Survey of Wild Fruits Plants in Bhandara District (M.S.), India, *Proceeding of NCEB*- 2013, ISBN-978-81-926403-0-3, P. 50-54.

Gupta A, Joshi, SP, ,Manahas, RK. (2008) Multivariate analysis of diversity and Composition of weeds communities of wheat fields in Doon valley. Ecological research Lab., Department of Botany, D.A.V. (PG). College, Dehradun (248007) Uttrakhand India. Holm,

Pancho J,h Herberger , D. Plucknett. (1979) A Geographical Atlas of World Weeds. John Wiley and Sons, New York, 391 pp.

Holm L, Plucknett D, Pancho J, Herberger J (1977) The World's Worst Weeds: Distribution and Biology. University of Hawaii Press, Honolulu, 609 pp.

Hussain F, Murad A, Durrani MJ (2004) Weed communities in the wheat fields of Mastuj District Chitral, Pakistan. Pak. J. Weed Sci. Res. 10(3-4): 101-108.

Hussain F, Shah SM, Fazal-e-Hadi, Asadullah.(2009). Diversity and ecological characteristics of weeds of wheat fields oUniversity of Peshawar Botanical Garden at AzaKhel, District Nowshera, Pakistan. Pak. J. Weed Sci. Res. 15 (4):283-294.

Jethro Tull (1731) ' Horse Hoeing Husbandry'. Berkshire. MDCC, 33.

Kaul MK (1986) Weed flora of Kashmir valley. *Journal of economics and taxonomic Botany*. Additional series scientific publishers, Jodhpur, India.]

Oudhia P and Tripathi, RS (1997) Allelopathic effects of *Parthenium hysterophorus* L. on kodo, Mustard and problematic weeds. First Intern. Conf. on *Parthenium* management. 11. UAS, Dhaward. India. 6-8 Oct. 1997, pp.136-139.

Oudhia P and Tripathi RS (1998) Allelopathic potential of *Datura stramonium* L. Crop Res. 16(1): 37-40

Shailey and Gaur, RD (1993) Phyto-sociological studies of crops and weed association of Pauri district. Department of Botany. H.N.B Garhwal University. Uttrakhand, India.

Singh KN, Ara S, Wani GA Hasan, B, Khanday, BA (2007) A phyto-sociological association of weeds in winter crops of Kasmir valley. Indian J. Weed Sci. 39(1-2), 33-40.

Twari VJ (2013) Biodiversity of genus *Euphorbia* L., subgenus *Chamaesyce* raf., Euphobiaceae, proc.of conf. BDPP; 101-108.

© 2014 | Published by IJLSCI