

Short Communication

VIVIPARY IN *OROXYLUM INDICUM* (L.) VENT. AND *HOLARRHENA PUBESCENS* (BUCH.-HAM.) WALL. EX G. DON.

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ABSTRACT

Phenomenon of vivipary is rarely occurring in nature. Botanists have recorded vivipary in coastal plants. *Oroxylum indicum* (L.) Vent (Tetu) and *Holarrhena pubescens* (Burch.-Ham.) Wall. Ex G.Don (Kuda) are two medicinal plants. This natural vivipary is a first record in botanical science from Maharashtra state. This indicates that nature has given gift of vivipary for further scientific study.

Key Words: Vivipary, *Oroxylum indicum*, *Holarrhena pubescens*,

INTRODUCTION

Vivipary in flowering plants is defined as the precocious and continuous growth of the offspring when still attached to the maternal parent. Two main types, true vivipary (involving sexually produced offspring) and pseudo-vivipary (asexual offspring), may be identified. Vivipary has been described from slightly less than a hundred different species of flowering plants, of which we classify approx. 50% as having true vivipary, with the remaining species being pseudo-viviparous. Species with true vivipary tend to inhabit shallow marine habitats while those with pseudo-vivipary are mostly found in arctic, alpine, or arid habitats. We suggest that all of these habitats are characterized by extraordinarily coarse-grained environments for seedling establishment, albeit with major differences in patch size. In all of these situations the probability of an offspring being dispersed in time or space to a patch better than the parental patch is very low hence taxa with seed dormancy or seed dispersal mechanisms enjoy no particular advantage. We suggest that future research focus on species that are facultative pseudo-viviparous, as well as on comparisons of ecological and biomechanical aspects of viviparous and non-viviparous mangroves and sea grasses (Elmqvist and Cox, 1996). In some cases viviparous plants that germinate before they get detached from the parent plant. This is a natural phenomenon that is commonly observed in the plants of mangroves, where the seedling germinates while still attached with the parent plant.

Seeds

Seeds offer several advantages to angiosperms. Firstly, since reproductive processes such as pollination and fertilization are independent of water, seed formation is more dependable. Also seeds have better adaptive strategies for dispersal to new habitats and help the species to colonise in other areas. As they have sufficient food reserves, young seedlings are nourished until they are capable of photosynthesis on their own. The hard seed coat provides protection to the young embryo. Seed is the basis of our agriculture. Dehydration and dormancy of mature seeds are crucial for storage of seeds which can be used as food through out the year and also to raise crop in the next season. Vary long time dormancy remain alive after they are dispersed. This period again varies greatly according to environmental conditions. In a few species the seeds lose viability within a few months. Seeds of a large number of species live for several years. Some seeds can remain alive for hundreds of years. There are several records of very old yet viable seeds. The seed germinated and flowered after an estimated record of 10,000 years of dormancy. A recent record of 2000 years old viable seed is of the date palm, *Phoenix dactylifera* discovered during the archeological excavation at King Herod's palace near the Dead Sea.

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Some flowering plant fruits contain very large number of seeds. Orchid fruits are one such category and each fruit contain thousands of tiny seeds. Similar is the case in fruits of some parasitic species such as *Orobancha* and *Striga*. In case of *Ficus* species large number of tiny seeds disperses in nature (Allen and Meyer, 1998).

True Vivipary in Angiosperm

Considering the plants belonging to Bignoniaceae and Asclepiadaceae having papery seeds which are dispersed in the environment after maturation. *Oroxylum indicum* (L.) Vent. is a flowering plant, commonly called as Indian trumpet Tree, or 'Tetu' in Marathi. This tree grows up to a height of 12 m. This tree is native to the Indian Subcontinent. A large deciduous tree by habit, showing presence of pods as fruits with a length of 1.5 to 2 ft. the flower of this tree is dull red color with a pungent smell but still attracting many pollinators.

The flowering season of this tree being in the monsoons, the fruits (pods) are observed during December to March. The tree shows presence of the pod at the terminal end of the branch with 2-3 pods at a single terminal. To get into the details of the pod, each pod has a sideways marginal opening through which the pods get opened in two halves and the seeds are dispersed. During the month of April- May, the seed dispersal takes place. Each of the pods contains approximately 500-600 seeds. These seeds are arranged in very compact but simple manner which help them during its dispersal. Seed of *O. indicum*, is a small brown seed present at the bottom with thin papery structure surrounding it. These seeds are arranged in two layers in thin sheets inside the pod. The 2 layers are segregated by a very thin wooden sheet.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don

H. pubescens is a shrub or small sparsely branched deciduous tree with milky latex, generally growing in low altitude valley areas. The leaves are large and bright green. The flowers large and white, 2 cm in diameter, producing pendulous paired fruit follicles up to 30 cm long, split when mature. The seeds have dense tuft of silky hairs, which acts as a parachute as seeds carried on wind.

A Phenomenon of Vivipary Observed in Maharashtra State

A natural phenomenon of vivipary is not observed commonly in other plants as they require specific favorable condition for the seed to germinate. *Oroxylum indicum* tree having vivipary phenomenon was observed on 24th July 2013 in Thane district, Shahpur Taluka.



Oroxylum indicum true vivipary

As shown in the photograph, the seeds germinated in the pod itself it may be true vivipary, when the pod was still attached to the tree. Due to late bursting of the pod, few seeds remained in the pod itself. Seeds inside the pods having favorable conditions of moisture and nutrients and germinate.

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***Holarrhena pubescens* (Buch.-Ham.) Wall. ex G. Don.**



During the field visit at Mendha Lekha from 3 to 5 August 2012 in forested area. Few plants of Kuda (*H. pubescens*) germinated in pendulous paired fruit follicles. These observations shown in photograph, this natural phenomenon of vivipary never seen in above tree species due to dispersal of seeds after maturation in proper season. In present investigation fruits of *Oroxylum indicum* and *Holarrhena pubescens* seeds germinate within the fruit prior to abscission from the maternal plant. It has been observed in selected most wild plants because there are strong advantages for the seeds in delaying their germination until they reach places where the seedlings that emerge have a good chance of surviving (Burrows, 1989). It is a rare event in angiosperms involving complex ecophysiological processes (Cota-Sánchez, 2004).

Some notable vivipary conditions were obtained through the use of fungal spores of *Phytophthora parasitica* var. *sesame* on white seeds of sesamum by Dubey *et al.*, (2011). Such seeds on sowing in earthen pots produced infected plants with characteristic symptoms of blight disease. Plants nearing maturity induced morphological abnormalities in green pods. The pods while green and immature got splitted lengthwise due to emergence of few seedlings from the pods. The pathogen induced emergence of the radicle, hypocotyls and cotyledons through the seed coat within the pod. They reported such viviparous condition in 25-48.8% pods and 27.08-36.12% seeds. The viviparous pods were characterized by internal browning of pedicel, septum and placenta. The seeds carried white cottony growth of *P. parasitica* var. *sesame*. Such viviparous condition was not visible in pods with normal looking seeds. Vivipary in our case might be due to fungal stimulation. Similar work can be carried out in other plant species to further strengthen the proposed correlation between vivipary and fungal infection. Presence of pathogen in different parts of pods and seedlings were established by incubation and cleared preparation. In immature developing pods hyphae were observed in tissues of pericarp, placenta, locules and ovules (Dubey *et al.*, 2011). Yadav *et al.*, (2011) reported crypto-vivipary in *Capsicum annuum* L. cv. California Wonder at laboratory level by using various chemicals.

ACKNOWLEDGEMENT

Authors are thankful to President, BAIF Development Research Foundation, Pune and Director, Okios for ecological services, Pune for encouragement.

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