

## Study of Phenotypic Plasticity of fruits of *Luffa acutangula* Var. *Amara*

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### Abstract :

Plant species show different responses to different climatic conditions. Soil factors, temperature, sunlight etc. are varied at different places, accordingly same species can show some variations in sizes and shapes of fruits and leaves is called phenotypic plasticity. *Luffa acutangula* var. *amara* is wild member of Cucurbitaceae and extensively grow along coastlines of Mharashtra (India) showed some morphological vaiations at studied area like Malvan fort, Talebazar, Dahibav, Naringre, Ramgadhetc villages of Sindhudurgadistrict, Mharashtra. *Luffa acutangula* var. *amara* showed plasticity in growth cycle, season of flowering, leaves shape and fruit size at different sites of populations. In this paper fruit plasticity is studied. Maximum weights and sizes of fruits were recorded at Talebazar village and minimum sizes were recorded at Dahibav village of Malvan (MS), India.

Key words: Phenotypic Plasticity, *Luffa amara*, fruits, maximum weight, Fruit plasticity.

## 1 Introduction:

Due to environmental changes organisms show different physiological and morphological responses (Price, et al.,2003) and this is to adapt with environmental variations. All types of environmentally induced changes like morphological, physiological etc. can cause phenotypic plasticity. The term is used mainly to describe phenotypic response to environmental conditions (Kelly, et.al, 2012). Such changes may or may not remain throughout the life of that organism. The soil nutrients, temperature variations, sunlight exposures etc. affect the phenotypic plasticity in plants. (Silvertown, 1998). Plasticity in plants or plant parts is developed in response to a given environmental stimulus, rather than a characteristic of species. Some responses are examples of adaptive plasticity, providing a fitness benefit, whereas others are inevitable responses to physical processes or resource limitations (Weiner, J.,2004). For ecological expansion of invasive species, phenotypic plasticity is important tool (Martín-Forés, I. *et al.* 2017). Plasticity is adaptive feature to survive in the habitat. The morphological changes such as leaf area, thickness, height of plant etc. can alter photosynthetic ability necessary to survival of species.

*Luffa acutangula* var. *amara* is wild member of family Cucurbitaceae and extensively grow along coastlines of Maharashtra. During study it was observed that plant shows plasticity in growth cycle, season of flowering, leaves shape and fruit size at different sites of populations. In some villages of Malvan of Sindhudurga district, Maharashtra. The present paper deals with study of morphological fruit variations and plasticity study.

## 2. Material and Methods:

The fruit samples of *Luffa acutangula* var. *amara*. were collected from different sites of collection like Malvan fort, Aachra, Talebazar, Dahibav, Naringre, Ramgadh from Malvan of Sindhudurga district, Maharashtra.

About 15 fruits were collected from each site. The average weights, lengths and diameters of fruits were measured. The morphometric differences in fruit samples of *Luffa acutangula* var. *amara* were recorded. The data was statistically analyzed.

## 3. Results and Discussions:

Phenotypic plasticity is mainly seen in leaves. The leaves and overall growth of plant is mostly altered by light levels. Leaves grown in the light are thicker and smaller. This may to protect

them from direct sunlight and useful for maximum photosynthesis. On the other hand, plants grown in the shade having thinner and larger leaves to capture more light. (Rozendaal et al ,2006), (Lambers and Hendrik ,1992). Photosynthetic pathways can be altered due to water and salt stresses. In some species like *Nothofagus glauca* (Phil.) Krasser, *Picea sitchensis* (Bong.) Carr., *Thuja plicata*, etc. the response to shading varied from one trait to the other (Santelices, R. et al.,2013). In plant *Synsepalum dulcificum* ,it was observed that height in shaded seedlings was at least twofold higher than those in sun-exposed seedlings. It was also observed that shaded seedlings presented larger leaf blade areas than sun-exposed seedlings. (Tchokponhoué, D.A. et al, 2019).

*Luffa acutangula* var. *amara* shows plasticity in growth cycle, season of flowering, leaves shape and fruit size at different sites of populations. In some villages of Malvan and Devgad of Sindhudurga district, Maharashtra, the plants were located and showed morphological variations.

At Malvan site plants were of considerable height. The plants were mature. The leaves were thick, rough and small in size. The margins were sharp with crenate margin and acute apex. Fruits were of reduced size. The population of species was large. (Fig 1 and 2)

At Aachara, plant populations were small and in patches. The plants were tall with large thin leaves. The leaf margins were rounded. Fruits were comparatively large in sizes and pale in colour. The plants showed less maturity than plants of Malvan sites. The season of flowering and fruiting was late, as compared to Malvan.

At Ramgad and Dahibav sites, stem was more mature. The plants were tall. The leaves were rough and dark green in colour with round margins. The fruit size of Dahibav site was much reduced, whereas at Ramgad sites fruits were larger in sizes.

At Naringre, stem was tender green. Plants were tall with tender fruits. At Talebazar the plants were taller with large thin leaves, smooth margins, the flowers were larger with late season of blooming, fruits were larger in sizes. Fruits were more green and heavy in weights. (Table 1)

#### 4. Conclusion :

*Luffa acutangula* var. *amara* showed plasticity in growth cycle, season of flowering, leaves shape and fruit size at different sites of populations. Maximum weights and sizes of fruits were recorded at Talebazar village and minimum sizes were recorded at Dahibav village of Malvan (MS), India

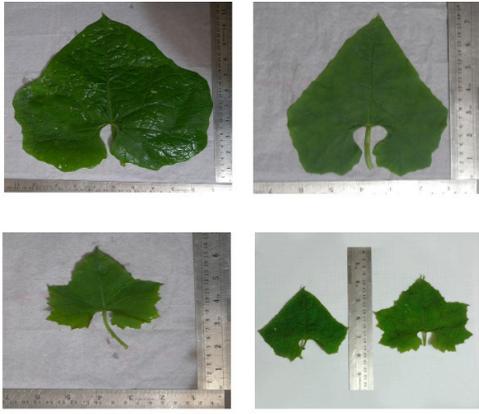
## 5. Acknowledgment :

Authors are thankful to Head of the department of Botany, Shivaji University, Kolhapur(MS) India, and Principal Shriram Junior College, Kuditre, (MS), India Kolhapur for providing laboratory facilities.

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a. At Talebazar b. At Aachara c. At Malvan fort d. Phenotypic differences

**Figure1: Phenotypic plasticity in leaves of *L. amara***



**Figure 2: Phenotypic Plasticity in fruits of *L. amara***

**Table 1: Morphological variations in fruit sizes at different sites (Fruit plasticity).**

Research Sites (Sindhudurga District )	Avg. Weight of fruit (gm)	Avg. Length of fruit(cm)	Avg.Fruit diameter(cm)
Malvan Fort	26.29 ±3.31	8.98 ± 1.14	6.17 ± 0.69

Aachara	19.15± 2.60	12.28 ± 1.53	8.35 ± 1.35
Talebazzar	44.53 ± 2.76	17.68± 1.48	9.65 ± 0.67
Dahibav	16.86 ± 1.04	10.17 ± 0.91	8.16 ± 0.80
Naringre	20.30 ± 2.24	12.47 ± 0.86	7.74 ± 1.17
Ramgadh	30.18 ± 1.49	16.43± 1.95	9.15 ± 1.37

(\*Values are expressed as Mean ± SD )