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A REVIEW ON MANGO LEAF WEBBER (ORTHGAEXVINACEA) AND HOST PLANT MANGIFERA INDICA L.

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ABSTRACT

Plants and insects interact to each other, for food, shelter, growth and pollination. Mango leaf webber (Orthagaexvinacea) dependent on Mangifera indica L. for nourishment, classification, morphological characters and protein describe both Orthagaexvinacea and Mangifera indica L. also describe uses of mango and life cycle of Orthagaexvinacea and listed some protein of Orthagaexvinacea and Mangifera indiacaL.

Keywords: *Mango leaf webber (Orthagaexvinacea), life cycle,Mangifera indica L.*

INTRODUCTION

The major part of insects is very important for humans and for the environment. For example, several insects are pollinators, several insects are predators on other harmful pests, and others areproducers of the valuable products such as honey and antibodies (Mohamed N., 2007). Plants as well as insect's growth is interdependent in several ways. Development of plant depend on availability of nutrient while insect development depends on the food quality of the host plant. Moreover, the plants food quality plays major role in behavior, growth and reproductive performance (Tahir Hussain Shah,2017). Reproduction is one of the important phenomena in the angiosperm's flower by plant and pollinators and its coevolution & mutual relationship with the variation in flower morphology such as flower size, flower color, scent, nectar, pollen and pollinator plays important role for some plant breeding mechanisms.The plant-insect interaction is a dynamic system,that is continual variation and change. Different plant develops different mechanism to reduce insect attack, inducing specific responses and also plant develops different active metabolic pathways by which plant alter their chemical and physical aspect. Insects feed, grow and reproduce on the host plant. Plant chemical derived substance, Protein derived molecular etc. are change or tum by the insects. (Marcia O. Mello*et al.*,2002). Plant species diversity and ecosystem function in grassland community'srelation can be changed by insect some cause are plant diversity gradients altering by biomass (A) Plants Species altering by relative abundances (B) by ecosystem function altering directly (Christa P.H Mulder *et al.*, 1999)Insect feeding on weed can have positive and negative both effects oncrop productivity, weed may affects the located crop plants by dispersing insects. Most insects are feed only on same plant, often within single family plants (John L Capinera,2005).Each plants and insects interact with different manner insects may act as protection for plants, insects may act asdisperser or fertilization for plants, while plant may be nest location for insects and plant may be energy or food resource for insects(Paul-Andre calatayud*et al.*, 2018).

Classification of Mango Leaf Webber:Kingdom: Animal
Phylum: Arthropoda **Sub Phylum:** Hexapoda**Class:**Insecta
Order: Lepidoptera
Family: Pyralidae
Genus: *Orthaga*
Species: *Orthagaexvinacea*

Classification of Mango:
Kingdom: Plantae **Division:** Angiosperm **Class:** Dicotyledonae **Sub class:** Rosidae **Order:** Sapindales **Family:** Anacardiaceae**Genus:***Mangifera* **Species:***indica* L.

Morphological Description of *Mangifera indica* L.

Mango tree are 30-meter-long in height and have regular canopy with a uniform outline and individuals have further or not so much similar crown forms. Crown is round in shape and dense in density. Mango tree growth are speedy growing and coarse in texture.

Leaves: Leaves are simple (not divided leaf blade), Incomplete (Sheath absent), Petioles present.Petioles are 15 mm or longer and alternately arranged. The leaf on branch is semi-upright in the upraised plant. Plant contain various color from light green to slightly brownish or purplish when young while become mature developed colour as acquires dark green (Juliana Cristina Viecclli *etal.*, 2016).

Inflorescence: Inflorescence was observed axillary and terminal position and grow semi-up right, Parallel and drooping, and recorded as conical, pyramidal and broadly pyramidal in shape (Kanchan bhamini *et al.*, 2018).

Flower: In the different genotype different flower colour such as pink, light green yellowish green was observed (Kanchanbhamini *et al.*, 2018).

Fruit: Generally, fruits are green, yellow and red in colour that depend upon the genotype. Fruit are generally round, oblong and obovoid in shape were depended upon the genotype. Size of fruit is also different in different variety depended on the genotypes (Kanchan Bhamini *et al.*,2018).

Uses:

Mango ripe and unripe fruit use as edible fruit and also used as flavor in many product such as fruit juice, ice-cream, wines, teas, breakfast cereals, muesli bars, and biscuits also as pickles prepare from mango green fruit and mango bark to extracted yellowish-brown dye used for silk and young leaves are provide as edible when boiled. Mango wood used for preparing furniturefor carving and also for floor paneling and utensil manufacture also used as fuelwood. Mango seed flour is used for treated diarrhoea. While gargling bark extract mixed with water which is used to treat diarrhoea and throat disorders. Also, night blindness and vitamin-A deficiencies were treated by ripe mango fruit because it's rich by vitamin-A (Jan S. E Bally, 2006).

2.3 Phytochemical of *Mangifera indica* L.

Mangos are a favourably nutritious fruit holding component such as carbohydrate, protein, fats, minerals and vitamin, in specific vitamin-A (β-carotene), B_1 , B_2 and vitamin-C (ascorbic acid). Increase concentrations of glycose, fructose, and sucrose while decrease concentration of vitamin-C. When the fruit ripen (Ian S. E Bally., 2006)

The mangos five varieties like (Willaed, Karthakolomban, Malwana, Bettiamba and Gira Amba) were carried through evaluated the nutritional possessions. Nutritional possessions were remarkably assorted among the dissimilar mango varieties. They found in karthakolomban mango highest edible protion (79.49%), total soluble solids (0.75%), ash, total carbohydrate, sugar (30.56 mg/100gm) and filer and in malwana mango found excessive amount of fat and moisture contentment and in bettiamba mango found greatest caloric value also found the pH value in the mango Willard, Karthakolomba, Malwana, Bettiambasequently 4.34, 4.41, 4.31, 4.67, (Highest) (lowest) (Kothalawala S.G *et al.*, 2017).(Mishra sunita., 2016) assessed nutrition composition tested from the mango vital by products like seed and peel to obtain fat, protein, carbohydrate, energy, moisture and ash.Mohamed Saleh Kouranyet *al.*, 2017, assessed the high nutritional value and fortification of protein, minerals and food stabilization. They observed the chemical composition of mango fortified such as**M**oisture (17.09%),**R**educing sugar (59.16%)**N**on-**r**educing Sugar (6.50%)**T**otal sugar (66.00%)**C**rude fibrer (1.76%)**P**rotein (10.54%)**A**sh (1.95%)**L**ipids (3.61%)**T**otal acidity like anhydro citric acid 2.27%) **pH** value (4.86%)and also obtain mang protein fortified to amino acid such as essential amino acid(Lysine, Histadine, Threonine, Methionine, Valine, Iso-leucine, Tyrosine, Phenyl-alanine) and Non-essential amino acid (Aspartic acid, Seronine, Glutamic acid, Proline, Glysine, Alanine) andalso obtain vitamin-C, β-carotene and minerals from protein fortified of mango.

Kittiphoom S., 2012, evoluted that the peel and kernel are generated from mango as by-product from that by-product to obtain oil, starch, and antioxidants. They study the mango seed contain starch, fat and protein and due to the high quality of mango kernel's fat, protein, and natural anti antioxidants to use as potential source for functional food ingredients, anti-microbial compound and cosmetic. Mango seed kernels content small content of protein while

most essential amino acid such as Leucine, Valine, and Lysine are containing with high value. They are also obtaining benefit source of polyphenols, Phytosterols as compesterol, sitosterol, and tocopherols from mango kernels and saturated fatty acid consist about 44-48% and un-saturated fatty acid consist about 52-56% from mango kernel.

Ara *et al.*, 2014, assessed the nutritional properties, vitamin, minerals and heavy metals in different varieties of *Mangifera indica* L. They analyzed ten varieties of mango namely Amrapali, Chausa, Fazlee, Gopalbhog, Guti, Himsagor, Khirsapat, Kohitoor, Langra and Mallika. They remarkably assorted the nutritional value among the different varieties of mango. They obtain from Langra mango to amount of **P**rotein (1.18gm/100gm)**C**rude fiber (4.78gm/100gm)**S**odium (91.15 mg/100gm) **A**nd from Gopalbhog mango to obtain highest edible portion (79.49%)**C**alcium (30.56% mg/100gm)**T**itratable acidity (0.75%)And they observed that all the ten different varieties contain important amount of**V**itamin-C (46.53-24.53 mg/100gm)**T**otal carbohydrate (27.33-4.49 gm/100gm)**T**otal sugar (5.48-4.27%) and moisture content.

(M.A fowomola.,2009) assessed the amino acid, protein, and anti-nutrients of *Mangifera indica*

L. seed. They observed proximate composition of mango seeds such as **C**rude oil (14.80 ± 0.13)

Crude protein (10.06 ± 0.12%) **Ash** (2.62 ± 0.025) **Crude** fiber (2.40 ± 0.01) **Carbohydrate** (70.12 ± 1.34) **Energy** content (453.92 ± 4.32 kJ/100g).

The mango seed result observed in which methionine has small amount (1.04 g/100gm ofprotein). While glutamate highest amount of (13.00 g/100g of protein). And also, essential aminoacid Leucine, contain highest value (8.40 g/100g of protein). They concluded that the mango seed content of anti-nutrient such as

Alkaloid (0.01 ± 0.0) **Tannin** (1.03 ± 0.01) **Phytate** (1.44 ± 0.01) **Saponin** (0.04 ± 0)

Oxalate (1.49 ± 0.01)**T**yrosine inhibition (18.42 ± 2.54)Also concluded the mango seed contentof vitamins such as vitamin-A, vitamin-E, vitamin-K, vitamin-B_1 , vitamin-B_2 , vitamin-B_6 ,vitamin-B_{12} , vitamin-C and also analysis the mineral from mango seed such as **S**odium

(21.0mg/100g)**P**otassium(22.3mg/100g)**C**alcium(111.3mg/100g)**M**agnesium(94.8mg/100g)**I**ron (11.9mg/100g)**Z**ink (1.1mg/100g)**C**opper (0.1mg/100g).

(Gordhan N patel.,2018) noticed that the mango kernel contains highest 20-fold, 50-fold, and 4- fold sequenly protein, fat, and carbohydrate than pulp of mango. They also analysis amino acid such as **H**istidine, **I**soleucine, **P**henylalanine, **M**ethionine, **L**ysine, **L**eucine, **T**ryptophan, **T**hreonine, **V**aline, **T**yrosine **(Essential amino acid)** and **A**lanine, **A**sparagine, **A**spartic acid, **G**lycine, **G**lutamine, **A**rginine, **C**ysteine, **G**lutamic acid, **S**erine, **P**roline **(Non-essential amino acid)** from mango kernel.

K. Rajalakshmi, 2010, accessed the analyzed the nutrient and compared data between ripe mangoand unripe mango. They also noted that the mangoes are plentiful in **v**itamin-E. Than other manyfruits and also observed minerals and component such as **p**otassium, **C**alcium, **P**hosphorus, **M**agnesium, **c**opper, **i**ron, **z**inc, **f**iber, and **v**itamin-A (beta-carotene), **v**itamin-B_6 , **v**itamin-C, **v**itamin-K. They noted the protein in unripe mango 0.83%. While in the seed (unripe) contain 0.05%.

Life Cycle of *Orthagaexvinacea*

Host PlantCaterpillar stage

Pupa stageAdult Stage
Host Plant:*Mangifera indica*(L.)
Egg: The egg laid by female moth on the leaves of host plant, and egg laid singly or in group. The colour of egg pale yellowish to green, oval and flatted. The female moth generally laid egg near the midrib or vain. The length of egg was 0.84mm and 0.56mm in width.
Larvae stage: The newly hatched contain pule green to light yellow in colour with brownish head. And contain black to brown dotes on the body, and also contain segment on the body. The larvae period takes 30-40 days. The length of larvae 2 to 3cm while width 0.3 to 0.4 cm thelarvae webbed the leaves with thin silken and stay inside.
Pupal Stage: The Pupal stage take place in web, inner side of the silk cocoon. The pupae were dark brown to reddish or blackish in colour. Length and breadth of pupa 1.3 to 1.5 cm and 1.5 to
1.6 cm. The duration of pupae was 14 to 17 days.
Adult stage: The adult of *Orthagaexvinaces* contain brownish grey in colour and wings with lines.

Review of *Orthagaexvinacea*
The mango leaf Webber, *Orthagaexvinacea* during the larval makes the silken webs. From the silk gland to produce the protein. Different stage to observed significant difference silk gland posterior, anterior and middle to protein estimate. Posterior region was having contain several proteins while anterior part/region not contain visible protein bands. (N sajitha*et al.*,2015). Mango insect pests diversity and nature of damage on mango tree were observed during differenttime/season/month like Hopper Amritodus Atkinson, active during post monsonic period/time, and IdioscopusClypealisnitidulus were active during full bloom period (January to March), Amrascasplendens was active during fruiting period of mango (March to April), thrips spp. Viz Rhipiphorothripscruentatus, Exothripshemavarna, Haplothripsganglbaueri and scirtothrips dorsalis were active during Vagetative and Fruiting and flowering period and fruits fly viz, Bactrocera dorsalis, B.correcta and B.Zonata active during April-July on fruit (JK Bana *et al.*,2018). Mango leaf Webber (*Orthagaeuadrusalis* walker) as major pest of mango and pest / mango leaf Webber life cycle and their management (H. Ravishankar.,2012). The

mango leaf Webber (*Orthagaevadrusalis* walker male and Female moth's life cycle walker and behaviours and *Orthagaevadrusalis* different stage were measured like egg, Larva, pre-pupa, Pupa Male, Pupa Female, Adult Male, Adult Female, and *Orthagaevadrusalis* different stage duration were observed during the working time(D.B patel*et al.*, 2007).

Protein name of *Orthagaexvinacea*

1. Cytochrome c oxidase subunit
2. Adipokinetic hormone

Protein present in Mangifera indica.

(1) Photosystem II protein D1
(2) Ubiquinol oxidase, mitochondrial
(3) Photosystem II D2 protein
(4) Ethylene receptor
(5) UDP-glycosyltransferase 13
(6) Photosystem I iron-sulfur center
(7) Cytochrome b6
(8) Cytochrome b6-f complex subunit 6
(9) Auxin response factor

REFERENCES

1) D. B Patel, D.M Korat, P. K Borad, (2007). Bionomics and Behaviour of Mango leaf webber, Orthagaeuadrusalis Walker. *Karnataka Journal of Agriculture Science*, 20(3), 644-647.
2) JK Bana, Sushil Kumar, Hemant Sharma, (2018). Diversity and nature of damage of mango insect pests in south Gujarat ecosystem. *Journal of Entomology and Zoology Studies*, 6(2), 274- 278.
3) N Sajitha, Gokuldas M, (2015). Biochemical analysis of silk protein of the mango leaf webbe, Orthagaexvinacea Hampson (Lepidoptera: Pyralidae). *Journal of Entomology and Zoology Studies*, 3(5), 285-290.
4) Tahir Hussain Shah., (2017). Plant nutrients and insect development. International Journal of Entomology Research., 2(6) 54-57.
5) Kanchan Bhamini, & Kumar, Anjani & Jaiswal, U.S. & Ahmad, Md & Rani, Ruby. (2018). Morphological Characterization of Mango (Mangifera indica L.) Germplasm Using DUS Testing. *International Journal of Current Microbiology and Applied Sciences*. 7. 2944-2959.
6) Juliana Cristina Viecclli., SIQUEIRA, D. L. D., BISPO, W. M. D. S., & LEMOS, L. M. C. (2016). Characterization of leaves and fruits of mango (Mangifera indica L.) cv. Imbu. *RevistaBrasileira de Fruticultura*, *38*(3).
7) Marica OMello, & Silva-Filho, M. C. (2002). Plant-insect interactions: an evolutionary arms racebetween two distinct defense mechanisms. *Brazilian Journal of Plant Physiology*, *14*(2), 71-81.
8) GM Masud Parvez, (2016). pharmacological Activity of Mango (Mangifera Indica): A review. *Journal of Pharmacognosy and Phytochemistry*, 5(3), 1-7.
9) DhuhaAlshammaa, (2016). Preliminary Screening and Phytochemical Profile of Mangifera indica Leaves's Extracts, Cultivated in Ieaq. *International Journal of Current Microbiology and Applied Science*, 5(9), 163-173.
10) KeshwaniDeeksha, Mishra Sunita, (2016). Preparation processing and nutritional attribute of mango by product. *International journal of science and research*,7(10),714-717.
11) Kittiphoom S, (2012). Utilization of mango seed. *International Food Research Journal*,19(4),1325-1335.
12) Kothalawala S. G, Jayasinghe J.M.J. K, (2017). Nutritional evaluation of different mango varieties available in Shi Lanka. *International Journal of Advanced Engineering Research and Science*,4(7),128-131.
13) Marica OMello, & Silva-Filho, M. C. (2002). Plant-insect interactions: an evolutionary arms racebetween two distinct defense mechanisms. *Brazilian Journal of Plant Physiology*, *14*(2), 71-81.
14) Mohamed Saleh kourany, Khalil Ibrahim Khalil, SamahAmed Abd-Eltawab, Adel Abdel Razek, Abd El Azim Mohdaly, (2007). Protein fortified mango and guava fruit bars: Ingredients optimization quality evaluation and storage stability. *International journal of*

Current Microbiology and Applied Science,6(12),2865-2877.

15) Mohammed A.H, Na'inna S. Z, Yusha'u M. Salisu B, Adamu, U. and Garba, S. A, (2016). Phytochemical Screening and Antimicrobial Activity of Mangifera indica Extracts. *UNYU Journal of Microbiology Research*, (1), 23-28.
16) N Sajitha, Gokuldas M, (2015). Biochemical analysis of silk protein of the mango leaf webbe, Orthagaexvinacea Hampson (Lepidoptera: Pyralidae). *Journal of Entomology and Zoology Studies*, 3(5), 285-290.
17) Nwankwo, I.U. and Osaro-Mathew,R.C,(2014).Assessment of the phytochemical components of Mangifera indica(leaf) and Musaparadisiaca (root) extract and their antibacterial activity against some common pathogenic bacteria. *ISOR Journal of Pharmacy and Biological Science*, 9(1), 8- 11.
18) Olasehinde G. I, Sholotan K. J, Openibo J. O, Taiwo O. S, Bello O. A, Ajayi J. B, Ayepola O.O. Ajayi A. A, (2011). Phytochemical and Antimicrobial Properties of Mangifera indica leaf extract. *Covenant Journal of Physical & Life Science* (CJOL), 6(1), 55-63.
19) Pintu K. Da, Arnapal, (2014). Effect of aqueous young leaves extract of Mangifera indica on gm (-) microorganisms causing gastro-intestinal disorders. *Asian Journal of Plant Science and Research*, 4(1), 23-27.
20) S. U Disol, M. Ali, S. I Mukhtar and M.Garba,(2017).Antimicrobial Activity and Phytochemical Screening of *Mangifera indica* L.(Mango) Stem and Leaf Extract on Clinical Isolated of Methicillin resistant Staphylococcus aureus. *Journal of Advances in Medical and Pharmaceutical Science*, 13(1), 1-6.