



A REVIEW ON CURRY LEAVES (*Murraya koenigii*) CHURNA FOR ITS DIGESTIVE PROPERTY

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ABSTRACT :

Murraya koenigii (curry leaves) is a medicinal plant found mostly in Indian habitat, where it is widely used as an aromatic and medicinal agent. It possesses various therapeutic properties like antioxidant, anti-diarrhoeal, anti-inflammatory, anti-obesity activity etc. which are documented in various Ayurvedic scriptures. The main objective is to evaluate the therapeutic properties, potential benefits and risk of using Curry leaves churna. The churna is prepared by dehydrating freshly harvested curry leaves while preserving its therapeutic abilities. This process is done using various different methods, further this dried curry leaves powder is combined with other potent ingredients which enhances the therapeutic index of the Churna. It improves the functioning of gastrointestinal tract, promotes faster digestion and provides relief from all kinds of digestive problems. It is used in various ways in Ayurveda system, it shows various pharmacotherapeutic properties and play an important role in management of gastrointestinal problems affecting human beings.

Keywords: Anti-diarrhoeal, pharmacotherapeutic properties, anti-obesity activity, antioxidant, antibacterial and antimicrobial.

INTRODUCTION :

Hippocrates father of medicine quoting "let food be thy medicine and medicine be thy food." which means food acts as medicine to maintain health and prevent diseases.

Traditional medicine system like Ayurveda, churna is powder dosage form which contain single or combination of drugs along with other ingredients, simply mixture of powder herbs.

Even some significant drugs use presently have been derived from the plant. *Murraya koenigii* is a small shrub also known as curry tree or curry patta. In Indian Ayurveda, it referred as a "Krishnanimba". The entire plant is used to prepare Ayurvedic formulation. curry leaf is member of the rutaceae family .it has been derived to the native to South Asia specially to Bangladesh, India and Sri Lanka.



Fig.1: Murraya koenigii plant

Morphological characteristics: -

Small shrub of about 2-2.5m height and dark green and brown stem. Aromatic leaves are long and seen to be in reticulate venation, flowers found to be small fragrant creamy white. It is self-pollinated so after the pollination the flowers turns into small round shaped sweet aromatic fruits.

Taxonomic classification:

Kingdom - Plantae
Subkingdom - Trophobionta
Super division - Spermatophyta
Division - Magnoliophyta
Class - Magnoliopsida
Subclass - Rosidae
Family - Rutaceae
Genus - *Murraya J. Koenig*
Species - *Murraya koenigii*

Chemical constituents:

Murraya koenigii is widely used in Ayurvedic science as it contains organic compounds such as alkaloids, flavonoids carbohydrates, and sterol that is extracted from plants using solvents such as petroleum ether, ethyl acetate, chloroform, ethanol and water.

Chemical constituents responsible for aroma are :-

- P-caryophyllene
- P- gurjunene
- o- phellandrene
- p- elemene

1) Leaves

Contains carbazole alkaloids crystalline glycosides, koenigine, girinimbine, koenine, koenidine, iso-mahanimbine and koenimbine, triterpenoid alkaloids, tetrahydromahanimbin, hexane mahanimbine also found proteins, minerals, carotene, carbohydrate, fibre, vitamin A, E, calcium and oxalic acid. The aromatic leaves considered as a tonic, analgesic, digestive and appetizer treatment of inflammation, itching, dysentery.



Fig.2: Leaves of *Murraya koenigii*

2) Seeds and fruits

Seed of *Murraya koenigii* consist consists of compounds which show anti-diarrhoeal properties such as furocoumarin lactone, carbazole alkaloids,

glycolipids, Phospholipids and terpinene. There various types of terpenes present like terpinen-4-ol, linolol, 50 ocimene, limblee, limbole and simbole. 51–53.

The fruit pulp contains 64.9% of moisture, 16.8% of total soluble solids, 48 9.76% of total sugar, 54 reducing sugar, 55 of non-reducing sugar, 13.35% of vitamin C, 1.97% of protein, 57 0.082% of phosphorus, 0.811% of potassium (32,2), 0.166% of calcium, 0.216% of magnesium, 58 0.007% of iron and 0.00057% of tannin.



Fig. 3: Seeds of *Murraya koenigii*

3) Stem and bark :

Matured stem and bark contain carbazole alkaloids, coumarin galactoside, carbazole carboxylic acid, glycolipids, phospholipid etc.

4) Roots :

Root, It contains murrayanol, murrayetin, marmesin-1''-O-rutinoside. The benzene extract of roots consists of mukoline and mukolidine. Other constituents - fibre, nicotinic acid.



Fig. 4: Stem and roots of *Murraya koenigii*

| Plant part | Chemical constituents | Biological activity |
|---------------|--|---|
| Leaves | Koenimbine Koenine Koenigine Mahanimbine Murrayazolidine Murrayazoline Bismurrayafoline E Euchrestine Bismahanine Bispyrafoline Isomahanine O-methyl murrayamine A O- methyl Mahanine Lutein Tocopherol Carotene | Antioxidant activity, Anti- diarrhoea Anti-oxidant Anti-oxidant, radical-scavenging properties Anti-oxidant Hepatoprotective Hepatoprotective Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Antioxidant activity Hepatoprotective Antioxidant activity |
| Stem and Bark | Girinimbine Murrayanine Dgalactopyranoside Maha nine Girinimbine Murrayazolinine | Anti-fungal and antibacterial Anti-viral, Anti-bacterial, Anti-fungal Topoisomerase I and II inhibitory activity Antimicrobial Anti-oxidant |
| Seed | Koenoline Kurryam, Koenine Koenimbi | Cytotoxic activity Anti-diarrheal activity Anti-diarrheal activity Anti-diarrheal activity |
| Roots | Mukoline | Cytotoxic activity |

Table 1: Biological activity of different chemical constituents identified from different parts of *Murraya koenigii*.

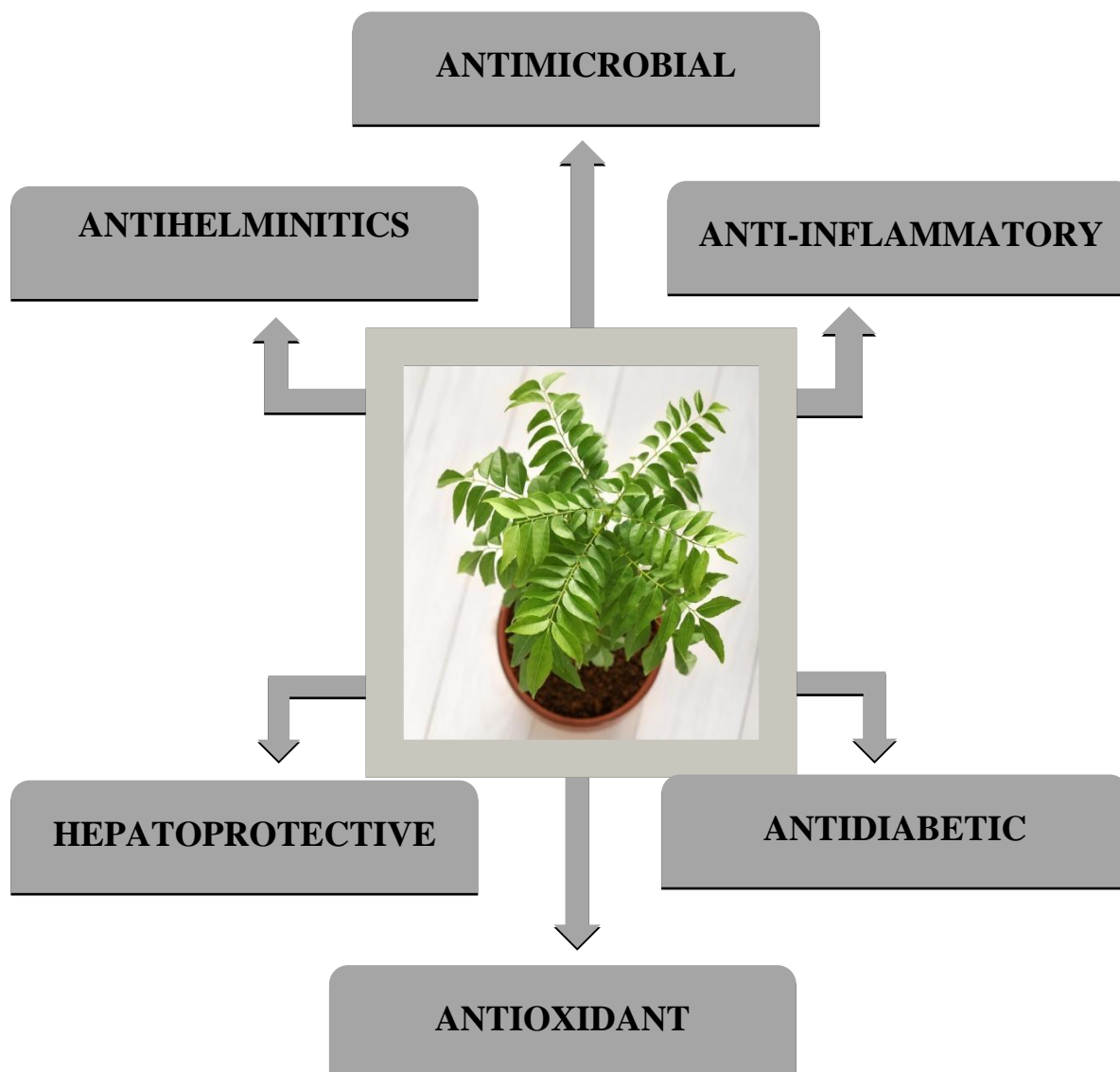
PHARMACOLOGICAL ACTIVITY / MEDICINAL USES: -

Fig. 5: Pharmacological activity of *Murraya koenigii*

Digestion boosting

Curry leaves boosts digestion relief from flatulence, prevent constipation, diarrhoea, dysentery, piles, nausea, bloating etc. because of its Deepan (appetizer) and Pachan (digestive property), curry leaves are rich in fibre makes digestion easier, which can help to promote bowel regularity and improves our digestive health.

Curry leaves are widely used in Indian cookery to promote digestion.

2) *Antiobese Activity/Lipid Lowering Agent*

Obesity means, an excess accumulation of body fat, main cause of obesity is an imbalance between intake and outflow of fat, Obesity leads hypertension and diabetes and some cancers.

Curry leaves contain mahanimbine alkaloid having anti- obesity and lipid lowering agent, helps to reduce the total cholesterol and triglyceride (fat) levels

Weight Management

Performance of animal studies shows that the presence of phytochemicals and dietary fibre in curry leaves helps in weight management and fat solubilisation.

3) Anti-Diarrheal Activity

Diarrhoea occurs due to irregularities in the small intestine or the large intestine. The digestion process too fast to allow for the large intestine to absorb the excess liquid.

The bioactive molecules namely koenimbine carbazole and kurryam obtained from the fractionated Soxhlet extract of *M. Koenigii* showed activity against diarrhoea and gastrointestinal motility, reduced stool frequency and increased Small intestinal transit time.

4) Anti-Ulcer Activity

Cause of ulcer is infection of the Stomach by bacteria (*H. pylori*), peptic ulcers can block passage of food through the digestive tract.

the anti-ulcer activity was observed using hot aqueous leaves extract, it inhibits gastric lesion, reduced gastric volume, ulcerative lesion, free and total acidity was seen.

5) Antioxidant Activity

Murraya Koenigii leaves have comparatively high antioxidant content to four other leafy vegetables. natural anti-oxidants derived from plant sources have been viewed as a Possible therapeutic for the prevention treatment of various illnesses, particularly cancer, cardiovascular disease.

Anti-Diabetic Activity

Diabetes mellitus, a metabolic disorder caused due to disfunction of pancreatic cells in production of insulin, which helps breaking down starch into simpler glucose for easy digestion. Due to low insulin production the starch molecules do not break down and gets stored in the body in form of fats which leads to overweight, obesity. Curry leaves Play a helpful role in management of diabetes due to their cost effectiveness. Mahanimbine Lower blood sugar levels by boosting pancreatic insulin secretion from Islets of Langerhans beta cells.

METHODS OF PREPARATION :

Churna is a mixture of finely powdered drugs those are derived or extracted from natural sources. It shows varied applications in Ayurvedic medicine. There are two types of churna: -

1. Simple Churna: It contains only one medicament.
2. Compound Churna: It contains two or more than two medicaments.

Churna is prepared by utilizing following steps: -

1. Cultivation
2. Collection, cleaning
3. Drying
4. Pulverisation
5. Sieved.

Cultivation: -

For cultivation of curry leaves the field is ploughed 3-4 times to get even sized seed beds that helps with the process of seedling emergence and ensures healthy root growth. The pit is dug to the size of 30 x30x30 cm with space intervals between the pits around 1.2 to 1.5 m, for one to two months before planting. Healthy seedlings are planted in the centre of the pits, after planting the pits are irrigated. On the third day of plantation the land is irrigated for the second time and further the irrigation process carried out once in a week.

Collection and cleaning: -

The curry leaves are handpicked and the insect larvae is destroyed using insecticide spray. The damaged or larva infected leaves are discarded and only fresh leaves are collected. These freshly harvested leaves are cleaned by soaking the leaves in water containing salt for a minute and the washed leaves are then spread on a piece of cloth and gently pressed with another cloth to pat it dry.

Drying: -

The leaves are dehydrated to preserve its therapeutic abilities and improve its shelf life.

Methods of drying: -

1. sun shade drying
2. conventional shade drying
3. Cabinet oven drying

Pulverisation: -

The Pulveriser processes dried curry leaves in batches or continuously by accepting incoming material, on a conveyor, rotating it, pressing and crushing it, then sending it out. They also aerate the powder to avoid it from forming a mass.

Sieving: -

The curry leave powder is passed through 80 mesh (sieve size); this ensures the uniformity of particle size of curry leaves powder.

Packing: -

After all these steps, the curry leaves powder packed in air containers and sealed properly.



Fig. 6: Churna of *Murraya koenigii*

PLAN OF WORK :

Aim: To carry out a review on Formulation and evaluation of (*Murraya koenigii*) curry leaves churna for as digestive property.

Objective: -

1. To evaluate the therapeutic properties of curry leaves churna.
2. To obtain adequate drying by using Standard procedures.
3. To identify the potential benefits and risk of using curry leaves churna.
4. To provide recommendations for safe and effective use of curry leaves churna in aromatherapy and other application.
5. To examine the methods of cultivation, collection, drying and extraction.

Need of work

1. For the adoption of natural medicine and treatments over synthetic ones.
2. Number of individuals still depend on age-old ayurvedic remedies to improve the quality of their lives, to fulfil the demands work is needed.
3. Improves lifestyle by eliminating adverse effect of drugs.
4. To evaluate the efficacy, effectiveness and safety of an herbal medicines.
5. To enhance future prospects of herbal medicines.

WORK PLAN SCHEDULE :

The present work is planned to preparation of curry leaves churna and study it's pharmacological activity, the work plan schedule is divided into 3 parts: -

Part -1

1. Selection of topics

Preparation of curry leaves churna is the topic which is selected on the basis of present literature. on the basis of data and literature the importance of topic will be selected.

2. Literature survey

Extensive literature survey was carried out to study and understand the project topic, the related articles to this study are captured and described in this synopsis.

Part-2

collection and drying of plant material used in curry leaves churna, it shows digestive property.

Part-3

formulation and evaluation of curry leaves churna will be done by using following techniques: -

1. Organoleptic evaluation
2. Microscopic evaluation
3. Physical evaluation - pH, moisture content. ash value.
4. Chemical evaluation - chemical test, Phytochemical assay.
5. Biological evaluation - Microbial content Amylolytic and Lipolytic activity

OUTCOME :

According to studies, curry tree has been considered effective against various diseases. Medicinal plants have significant therapeutic value and they have been used to treat various diseases and disorders since ancient times. Medicinal plants are the building blocks of Ayurvedic science. These studies aim to examine the impact of drug on human beings. Drug with benefits also have same detriment. Studies reports suggest that when curry leaves extract is taken together with blood pressure medicine, it may have negative effects. *Murraya koenigii* leaves have been assessed for the few pharmacological activities. They have exhibited lipid-lowering, Anti-diabetic, anti-diarrheal, Anti-oxidant, cytotoxic, Anti-microbial and Anti-ageing property.

It has the bioactive potential and it may be the best natural alternative to antibiotic therapy for tested microbes. Therefore, curry leaves could be effectively used as a natural remedy for bacterial infections and could be incorporated in everyday meals. According to recent animal studies, Weights of animals were increased after feeding of high fat diet. Repeated oral administration of *Murraya koenigii* leaves significantly reduced the body weight compared with high fat induced diet of respective group.

In high fatty diet group, there was found significant increase in both total cholesterol and triglycerides levels as compared to control group. Administration of *Murraya koenigii* leave significantly decreased in both cholesterol as well as triglycerides respectively. This study was carried out in order to investigate the hypoglycaemic and body weight reducing activities of *Murraya koenigii* in high fat induced diet of Wister rats. This animal model is considered as the adequate model for studying pathophysiology of human type 2 diabetes.

The results obtained in this study clearly demonstrate that *Murraya koenigii* leaves treatment was associated with a potent improvement of glucose intolerance. Therefore, according to these studies curry leaves churna is a potent ingredient for treatment of diabetes, diarrhoea, dysentery, obesity, infections caused by viral or bacterial sources etc. Dehydrated curry leaves preserve nutrients and enhances the therapeutic index and due to the curry leave churna being an Ayurvedic preparation, it can be administered regularly in a controlled amount prescribed by a health professional.

Curry leaves churna preserves all the therapeutic properties and improves its shelf life, when it taken on an empty stomach, they help stimulate the release of digestive enzymes. Additionally, they also support healthy bowel movements. Curry leaves activate pancreatic cells to produce insulin. Therefore, it helps the breakdown of starch into simpler compounds to promote digestion. Curry leaves churna can be consumed by all generations considering the individual's dietary restriction and allergy index.

USES :

- Curry leaves shows anti-inflammatory, antibacterial, antimicrobial, antidiabetic properties.
- Curry leaves boosts digestion, relief from flatulence, prevent constipation, diarrhoea, dysentery, piles, nausea, bloating etc. because of its Deepan (appetizer) and Pachan (digestive property), curry leaves are rich in fibre makes digestion easier, which can help to promote bowel regularity and improves our digestive health.
- Curry leaves activate pancreatic cells to produce insulin. Therefore, it helps the breakdown of starch into simpler compounds that can be easily be digested.
- Curry leaves contain mahanimbine alkaloid having anti- obesity and lipid lowering agent, helps to reduce the total cholesterol and triglyceride (fat) levels.
- Curry leaves churna can be consumed by all generations considering the individual's dietary restriction and allergy index.
- Converting curry leaves into churna form helps preserve its therapeutic properties and improve its shelf life.

REFERENCE :

1. Arti Bochare, Shankar Aher, Dhanashri Jadhav, A review article on Curry leave (*Murraya koenigii*), International Journal of Creative Research Thoughts., 2023.
2. Mario A. Tan, Niti Sharma, and Seong Soo A. An ;2022, Multi-Target Approach of *Murraya koenigii* Leaves in Treating Neurodegenerative Diseases, Pharmaceuticals 2022, 15, 188.
3. D.T. Abeysinghe, a, K.A.H. Kumara, a K.A.D. Kaushalya, a U.G. Chandrika and D.D.D.H. Alwisa;2021, Phytochemical screening, total polyphenol, flavonoid content, in vitro antioxidant and antibacterial activities of Sri Lankan varieties of *Murraya koenigii* and *Micromelum minutum* leaves, Heliyon 7 (2021) e07449.
4. Anjana Goel, Ayushi Sharma, Sunanda Kulshrestha, 2020., A Phytopharmacological Review on *Murraya koenigii*: An Important Medicinal Plant, Int. J. Pharm. Sci. Rev. Res.
5. Habeeba Shaikh, Siddiqua Shaikh and Dr. Priya Rao,2020, A review on Indian traditional herb *Murraya Koenigii* it's nutritive and medicinal properties in human health management, World Journal of Pharmaceutical Research.
6. Shashank Tiwari, Shreya Talreja, A Pharmaceutical Importance of *Murraya koenigii* – A Complete Study, Indian Journal of Public Health Research & Development, November 2020, Vol. 11, No. 11
7. Rengasamy Balakrishnan, Dhanraj Vijayaraja, Song-Hee Jo, Palanivel Ganesan, In Su-Kim, Dong-Kug Choi ;2020, Medicinal Profile, Phytochemistry, and Pharmacological Activities of *Murraya koenigii* and its Primary Bioactive Compounds, Antioxidants (Basel);9(2):101.
8. Vandana Sablania, Sowriappan John Don Bosco, Mudasir Bashir,2019, Extraction process optimization of *Murraya koenigii* leaf extracts and antioxidant properties, J Food Sci Technology.
9. Mamta Parnami and Dr Kanika Varma;2018, Therapeutic Potential of *Murraya Koenigii* (Curry Leaves) In Dyslipidaemia: A Review, International Journal of Scientific Research and Management Studies.
10. Joshi T, Jain T, Mahar R, Singh SK, Srivastava P, Shukla SK, Mishra DK, Bhatta RS, Banerjee D, Kanojiya S. ;2018, Pyranocarbazoles from *Murraya koenigii* (L.) Spreng. as antimicrobial agents. Nat Prod Res. ;32(4):430-434.
11. Samanta SK, Kandimalla R, Gogoi B, Dutta KN, Choudhury P, Deb PK, Devi R, Pal BC, Talukdar NC;2017, Phytochemical portfolio and anticancer activity of *Murraya koenigii* and its primary active component, mahanine. Pharmacological Research.
12. Jagtap S, Khare P, Mangal P, Kondepudi KK, Bishnoi M, Bhutani KK;2016, Effect of mahanimbine, an alkaloid from curry leaves, on high-fat diet-induced adiposity, insulin resistance, and inflammatory alterations. Research Communication, Bio factors. ;43(2):220-231.
13. Dahiya J, Singh J, Kumar A, Sharma A;2016, Isolation, characterization and quantification of an anxiolytic constituent - mahanimbine, from *Murraya koenigii* Linn. Spreng Leaves, Journal of Ethnopharmacology. Dec 4; 193:706-711.
14. Hanan Al Harbi, Dr. Uma M. Irfan and Dr. Sarah Ali, 2016, THE ANTIBACTERIAL EFFECT OF CURRY LEAVES (*Murraya Koenigii*), European Journal Pharmaceutical and Medical Research 3(10):382-387
15. Ramasamy A, Das S, Mani V, Sengottuvelu S, Vinoth Prabhu V,2016, Evaluation of Anti-diarrheal Potential of Hydro-alcoholic Extracts of Leaves of *Murraya koenigii* in Experimental Animals, J Diet Suppl. ;13(4):393-401.
16. Suman Singh, P. k Omre and Sandhya Madan Mohan, 2014, Curry leaves (*Murraya koenigii* Linn. Sprengal)- A Miracle Plant, Indian J.Sci. Res.4 (1): 46-52.
17. Sachin V. Tembhumre, Dinesh M. Sakarkar, 2012, Anti-obesity and hypoglycaemic effect of ethanolic extract of *Murraya koenigii* (L) leaves in high fatty diet rats, Asian Pacific Journal of Tropical Disease, Pages S166-S168.
18. Paul S, Bandyopadhyay TK, Bhattacharyya A;2011, Immunomodulatory effect of leaf extract of *Murraya koenigii* in diabetic mice. Immunopharmacology Immunotoxicology ;33(4):691-9.
19. Birari R, Javia V, Bhutani KK;2010, Anti-obesity and lipid lowering effects of *Murraya koenigii* (L.) Spreng leaves extracts and mahanimbine on high fat diet induced obese rats. Fitoterapia;81(8):1129-33.
20. Suvra Mandal, Anupam Nayak, Manoj Kar, Samir K. Banerjee, Ashes Das, S.N. Upadhyay, R.K. Singh, Avijit Banerji al, Julie Banerji ;2009, Antidiarrheal activity of carbazole alkaloids from *Murraya koenigii* Spreng (Rutaceae) seeds, Fitoterapia.
21. Jain M, Gilhotra R, Singh RP, et al. Curry leaf (*Murraya Koenigii*): a spice with medicinal property. MOJ Biol Med. 2017;2(3):236–256.
22. Dipika Bhusal and Dharendra Pratap Thakur, /Curry Leaf: A Review, Reviews in Food and Agriculture (RFNA), 2021,2(1) :36-38
23. PCD PERERA AND N DAHANAYAKE, Current Status and Future Prospect of Curry (*Murraya koenigii*) Leaves in South Asia, Journal of Agri search, 2015,2(3) :212-217.

24. Yurleni, Adriani, Antioxidant Activity and Bioactive Components of Curry Leaves (*Murraya koenigii*) to Lower Red Meat Cholesterol: Morphological, Chemical Content Curry Leaves and Putrefaction Test of Meat, *Advances in Engineering Research*, 2020, volume 205
25. Priyanka Suthar, Satish Kumar, Vikas Kumar, Devina Vaidya, Ajay Sharma, Ajit Sharma, *Murraya koenigii* (L.) Spreng: Speculative ethnobotanical perspectives of ubiquitous herb with versatile Nutra/functional properties, *South African Journal of Botany*.
26. Siddig Ibrahim Abdelwahab, Manal Mohamed Elhassan Taha, Global research trends of the studies on *Murraya koenigii* (L.) spreng: a Scopus-based comprehensive bibliometric investigation (2023), *Bulletin of the National Research Centre* volume 47, Article number: 138
27. Rutuja Patil, Satish Mandlik and Deepa Mandlik, *Murraya koenigii* (Curry Tree): A review of its Phytochemistry, Ethnomedicinal uses, and Pharmacology with Respect to Molecular Mechanisms, *Current Traditional Medicine*, Volume 10, Issue 5
28. R Gopal, R Ambiha, N Sivasubramanian, Patel Vidhi Bhupendrabhai, Solanki Itishaben Girishbhai, Solanki Nilam Govindbhai, Sutariya Darshan Narendrabhai, Suthar Niyatiben Jigneshkumar & Vaghela Artiben Rameshbhai, 2023, Effect of curry leaves in lowering blood pressure among hypertensive Indian patient 2023 Oct 31;19(10):1020-1024.
29. Parithy, M.T., Mohd Zin, Z., Hasmadi, M., Rusli, N.D., Smedley, K.L. and, Zainol, M.K., Antioxidants properties of *Murraya koenigii*: a comparative study of three different extraction methods., 2021. *Food Research*.