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# ORGANIC CULTIVATION AND EVALUATION OF *CYPERUS ROTUNDUS* LINN.

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## ABSTRACT
This research paper knuckle down the organic cultivation of the *Cyperus rotundus* Linn. concurrently with pharmacognostic evaluation. Herb belonging to Cyperaceae family was organically cultivated in our herbal field laboratory (no. 4) by sowing sedges line to line in experimental blocks. The field experimental work was conducted from July, 2017 up to May, 2019 in Department of Medicinal Plants Sciences at Dev Sanskriti Vishwavidyalaya, Haridwar (U.K), India. Pharmacognostic evaluation of organic produce was done on some parameters including total Ash (7.2 % w/w), Acid-insoluble Ash (2.866 % w/w), Water-soluble Ash (2.433 % w/w), Alcohol soluble extractive (33.76 % w/w) and Water soluble extractive (8.0 % w/w). Secondary metabolites are highly biosynthesized during organic agripractices and resulting in higher therapeutic index of the drug. Further, the processed products from these organic produce may prove as wonder remedy in curing multiple acute and chronic disorder or diseases of human being.

**KEYWORDS:** WHO-GACP; Febrifuge; Aphrodisiac; Therapeutic Index; Antioxidant.

## INTRODUCTION
The herbs have been conspicuous sources of medicines since the illumination of civilization under different systems of healing including Ayurveda, Unani, Siddha and Homoeopathy[1]. Motha (*Cyperus rotundus* Linn.) is endorsed as wonder herb due to presence of health benefitting nutrients. It is commonly known as Motha, Ayurveda. Ambodhara is another name of Musta, a species of medicinal plant and used in the treatment of fever (Jvara), as described in the Jvarachikitsa, which is part of the Madhavachikitsa, a Sanskrit classical work on Ayurveda [30]. It has been relegated as underutilized herb. Underutilized plants are domesticated or wild plant species that have been used for centuries for their food, fiber, essential oils or medicinal properties, but have been reduced in importance over time owing to particular supplies and use constraints[1,4-7,13]. Medicinal potential of the plants need to be explored through enticing research and development activities. WHO-GACP (Good Agriculture and Collection Practices) and GHPP (Good Harvest Processing Practices) followed along with organic cultivation of the herb[2-4]. WHO had already established that quality of finished products depends upon quality of crude drugs (raw materials) used in manufacturing[8-10]. Biosynthesis of secondary metabolites enhances during organic farming and resulting in higher therapeutic index of crude drug. Methanolic extract of the sedges is used in cosmeceutical and pharmaceutical compositions for the treatment of the Balbaja, Musta in India[2,19,30]. *Cyperus rotundus* Linn. (Musta) refers to "a medicinal powder", and is used throughout Ayurvedic literature such as the Charaka Samhita and the Sushruta Samhita. It is used for curing uterine and vaginal disorders. It was originally composed by Sushruta in his Sushruta Samhita Sutrasthana XXXVIII, a classic work on depigmentation of the skin. In Chinese system of medicine, the drug prepared from the sedges is used in the treatment of female disorders. The alcoholic and aqueous extract of the sedges possesses lipolytic activity and reduce obesity by releasing enhanced concentration of biogenic amines from nerve terminals of the brain, which further, suppresses the appetite centre (The Wealth of India -First supplement series: Cl-Cy, 2010)[16]. The Powder controls blood pressure by lowering the bad cholesterol level in blood (The Wealth of India -Second supplement series: A-F, 2010)[15]. In Indonesia, the nut grass was used to treat diarrhoea, dysentery, fevers, parasites, gastritis, indigestion, and sluggish liver symptoms (Saroni and Wahjoedi, 2002)[26]. Weenen et al. (1990) stated that *C. rotundus* is a traditional herbal medicine used widely as antioxidants, analgesic, sedative, antispasmodic, antimalarial, stomachic disorders and to relieve diarrhea[27]. *Cyperus rotundus* Linn. is also used for disease of the spleen and for checking haemorrhage[11-16]. These antioxidants shows free radical scavenging and lipid peroxidation activities. Multiple disorders and diseases are major

concerns that need to be addressed to save huge amount of exchequer through rational exploration of medicinal plants potential through sustainable promotion of cultivation and conservation of the underutilized herbs. Although, it is considered as weed throughout the world. Controlled propagation, cultivation and post harvest management is very crucial for fetching optimum returns. Lemongrass [*Cymbopogon flexuosus* (Steud.)Wats] hedge was used for controlled growth.

**Details of the Plant**

Hindi Name: Motha, Balbaja, Musta, Ambodhara
Common Name: Nut sedge
Botanical Name: *Cyperus rotundus* Linn.
Family: Cyperaceae

**Geographical distribution**

It is a cosmopolitan weed common in tropical and subtropical climate. It can be successfully grown up to 800 m asl. It is highly resilient and drought resistant herb requiring minimal care for cultivation, harvesting and post harvesting operations.

**Plant part used**

Sedges are used for curing purposes under different systems of healing including Ayurveda, Unani, Siddha and Homoeopathy. *Cyperus rotundus* Linn. is a pungent bitter sweet herb that relieves spasms, pain, acting on digestive and uterine system. It is also used to cure number of disorders and disease. It is diuretic, litholytic, carminative (decreases flatulance), emmenagogue, anthelmintic, analgesic, antiiflammatory, anti-dysenteric, anti-rheumatic, antibacterial, antimicrobial, febrifuge, antispasmodic, astringent, diaphoretic, anorexia, ulcerative colitis, epilepsy and vatarakta. It is also used as general tonic to enhance vigour and vitality of the body. It is a good source of flavonoids and antioxidants[19-20,23, 24,26].

**Materials and Methods**

**General experimental procedure**

The experimental block was located in organic field laboratory (no. 4) in Department of Medicinal Plants Sciences at Dev Sanskriti Vishwavidyalaya, Haridwar (U.K), India.

Propagation was done by sedges. Our indigenous sedges were used for propagation in the experimental block (600 X 100 cm) in first week of July. The experiment was conducted from July, 2017 to May, 2019.

The experimental block was tilthed properly and levelled.

For manuring 30 kg vermicompost was used as it acts as wonder agent for enhancing soil fertility, having pesticidal and insecticidal effects also.

The sedges were manually sown in the experimental block with spacing of 30 X 20 cm. 120 sedges were manually sown in the block. 30 sedges were sown in each line.

Lemon grass [Cymbopogon flexuosus (Steud.)Wats] was planted as hedge to control the propagation of the weed herb (Caution: Cyperus has allelopathic effects. Hence, the lemon grass should not be used for herbal tea, aromatic oil extraction or other beverage purposes except for fodder usage).

Irrigation was given just after sowing of sedges. Rainfed irrigation was sufficient to the herb. 2-3 irrigations were given in summer season only.

Weeding and Hoeing was done at proper intervals. The crop was harvested after 23 months. (Caution: Premature harvesting (not before 18 months) lead to loss of therapeutic potential of the herb).

**Harvesting and Post- harvest handling**

The crop was harvested by uprooting nut sedges. Further, sedges were washed, cleaned and graded. The moisture content was reduced up to 12 % for maintenance of the quality of the herb and stored in an air tight container.[12-14, 20]

**Pharmacognostic Evaluation**

In pharmacognostic studies were performed including determination of ash values, water soluble extractive value, alcohol soluble extractive value, water soluble ash value and acid insoluble ash values. The sedges were grounded properly and made powder (sieve # 80). These studies were performed by following standard procedures of Indian Pharmacopoeia (I.P.) and Ayurvedic Pharmacopoeia of India (A.P.I.). The following quality parameters were tested-

**Determination of total ash**

The ash value was determined by incinerating about 3g of the powdered air-dried material, in a previously weighed crucible at gradually increasing temperature up to 450-500 $^{\theta}$ until it is carbon free. Cooled in desiccators and weighed. The percentage of total ash was calculated and expressed as % w/w of air dried crude drug material.

**Determination of water soluble extractive value**

5 g accurately weighed powder was macerated in a glass-stopper conical flask by 100 ml chloroform water (2.5 ml chloroform and volume make up to 1000 ml with distilled water) for 6 h, shaking frequently and then allowed to stand further for 18 h then it was filtered rapidly and 20 ml of the filtrate was transferred in a tarred flat bottom evaporating dish and evaporated to dryness on a boiling water bath. Then evaporating dish was dried at 105$^{\theta}$ for 6 h, cooled in desiccator and weighed. From the weight of the residue the percentage of water soluble extractive was calculated and expressed as % w/w with reference to air dried sample.

**Determination of alcohol soluble extractive value**

5 g accurately weighed powder was macerated in a glass-stopper conical flask by 100 ml alcohol of specified strength (45%, 60%, 90%) for 6 h, shaking frequently and then allowed to stand further for 18 h then it was filtered rapidly and 20 ml of the filtrate was transferred in a tarred flat bottom evaporating dish and evaporated to dryness on a boiling water bath. Then evaporating dish was dried at $105^{\theta}$ for 6 h, cooled in desiccator and weighed. From the weight of the residue the percentage of alcohol soluble extractive was calculated and expressed as % w/w with reference to air dried sample.

**Determination of water soluble ash**

Boil the ash for 5minutes with 25 ml of distilled water. Collect the insoluble matter in a gooch crucible, or on an ashless filter paper (whatman 41), wash with hot water, dry on a hot plate and ignite for 15 minutes at a temperature not exceeding $450^{\theta}$. Allow the residue to cool in a suitable desiccators for 30 minutes and weigh without delay. Subtract the weight of the insoluble matter from the weight of the ash, the difference in weight represents the water soluble ash. The water soluble ash was calculated and expressed as % w/w with reference to air dried sample.

**Determination of acid-insoluble ash**

To the crucible containing total ash, add dropwise 25 ml of dil. hydrochloric acid. Collect the insoluble matter in a gooch crucible, or on an ashless filter paper (whatman 41), dry on a hot plate and ignite for 15 minutes at a temperature not exceeding $450^{\theta}$. Allow the residue to cool in a suitable desiccators for 30 minutes and weigh without delay.[15-18, 21, 25, 27, 29]

## RESULTS AND DISCUSSION

*Cyperus rotundus* Linn. is predicted in wild conditions under sub-tropical and tropical climate up to an altitude of 800 m asl.

The herb was organically cultivated in our organic field laboratory no. 4 and it showed fair results after pharmacognostic evaluation. The evaluation of the crude drug was done in triplicate and average of the following parameters are reported below-

Total Ash: 7.2 % w/w
Acid-insoluble Ash: 2.866 % w/w
Water –soluble Ash: 2.433 % w/w
Alcohol soluble extractive: 33.76 % w/w
Water soluble extractive : 8.0 % w/w

Minerals and secondary metabolites biosynthesis was enhanced due to organic agripractices of the herb as reflected from ash value.

The processing products from this potential underutilized herb may be worked out for acute and chronic diseases or disorders. Allelochemicals are secondary metabolic products biosynthesized by Motha (*Cyperus rotundus* Linn.) having antioxidant and antimicrobial activities along with potential for discovery of new drug molecules. The researcher explored the controlled organic agripractices of the weed herb and pharmacognostic studies for quality evaluation.

There is an ample scope for investigation of other members of Cyperaceae family for novel drug discovery and development.

## CONCLUSION

Current research paper paved the way for future investigators to carry out research on other underutilized weed herbs through organic cultivation practices so that quality products may be attained concurrently with significant contribution in nation building along with sustainable management of the resources.

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