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Therapeutic potential of wild edible vegetables - A Review

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ABSTRACT

Wild edible plants play an important role in the livelihood of people residing in rural areas. Even today in most of the remote areas, people depend on plants which are available in their natural surroundings for food, medicine, shelter etc. Majority of wild edible vegetables have medicinal property and can be used to treat common ailments. The present paper focuses on ethno-medicinal properties of some non-cultivated, traditional vegetables from published research articles, books and web based search engines. On the basis of available ethno-botanical information through published literature studies, it is observed that one or the other part of wild vegetables belonging to about 97 species of 48 families are used as medicine apart from their nutritional benefits. About 43 species of leaves, 14 species of rhizome/tuber, 11 species of fruits, 9 species of shoot/stem, and 7 species of flowers are used for food as well as medicinal purposes. Total 66 among these are used internally, 21 are used externally and 14 are being used for both internal and external administration. About 52 different disease conditions like diabetes, rheumatism, dysentery, dyspepsia, gastritis, constipation, urinary disorders are frequently treated by these wild vegetables. These are easily available in natural habitat, cheap and excellent source of nutrients like proteins, carbohydrates, iron, essential minerals and other secondary metabolites. Regular use of these vegetables may indirectly act as an alternative source of medicinal drugs along with nutritional benefits. Further, they can be analyzed for their bioactive constituents and introduced as diet in routine clinical practice.

Key words: *Diet, Dietary Supplements, Nutraceuticals, Wild Vegetables.*

INTRODUCTION

Man has tremendous influence on wild edible plants since before civilization because of their high nutritional value as well as medicinal importance. These plants play an important role in the livelihoods of rural households and forest inhabitants and act as an integral part of the subsistence strategy of people in many developing countries.[1] Between 60-70% of populations in developing countries living in agricultural and forest areas collect various plant parts and foods from the forest species such as roots, leaves, fruits, and nuts which forms an integral part of their daily diets.[2] These wild edible vegetables not only serve as alternatives to staple food during periods of food deficit but they play as a valuable supplement for a nutritionally balanced diet.[3]

There are 45,000 species of wild plants out of which 9,500 species are ethno-botanically important species. Among these 7,500 species are in medicinal use for indigenous health practices. About 3,900 plant species are used by tribal as food, out of which 145 species

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comprise of root and tubers, 521 species of leafy vegetables.[4] India secured second position in the world, next to china, in vegetable production. However, this is much less than the recommended requirement of 300g / capita / day of vegetables for a balanced diet. Although, 175 major and minor vegetable crops are grown in India including 82 leafy vegetables, there is a challenge to achieve the target of 160 million tons of vegetables to fulfill the recommended requirement by 2020.[5]

Traditional knowledge of wild food is largely transmitted through participation of individuals helps for future generation to obtain inexpensive food resource.[6] Knowledge related to wild edible plants is rapidly eroding because they are largely ignored by the people. Documentation of traditional knowledge regarding wild edible plants limited compared to medicinal plants.[7] Hence, the present work is carried out to review the information regarding the medicinal uses of traditionally used vegetables.

Materials and Methods

Research articles from various ethno-botanical journals, other research journals and books were referred to gather the information regarding the traditionally used vegetables and their medicinal uses.[8-27] The data obtained is critically reviewed and arranged systematically with reference to their botanical identity, part used, route of administration, method of use and dosage form.

Observation and Results

The collection and consumption of wild edible vegetables has been a way of life to supplement dietary requirements for many rural populations.[28] Compared to conventional, cultivated vegetables, wild food plants require less care, are not affected by pesticide pollution, and they are a rich source of micronutrients. Due to social change and acculturation processes, traditional knowledge about the use of wild edible species is declining and even vanishing.[29] The loss of traditional knowledge has also been recognized as one of the major factors that have negative effects on the conservation of biological diversity.[30] Thus, there is an urgent need to document and revitalize traditional knowledge of wild edible plants to preserve them for future generation.[31] To effectively use wild plants, one must learn basic plant identification skills, proper collection and preparation methods.

Different traditional vegetables used for medicinal purpose are tabulated in table 1 along with their part used, route of administration, method of use and dosage form. Analysis of the ethno botanical information revealed that, one or the other part of wild vegetables belonging to about 97 species of 48 families are used as medicine in different parts of India. Most of the plants reported were collected from their natural habitat and few of them are cultivated in home gardens. Cucurbitaceae is represented by the highest number of species (9) followed by Araceae (8 species). Amaranthaceae, verbenaceae and zingiberaceae each comprise five species.

As per parts of the plant used for the preparation of medicine, 43 species of leaves, 14 species rhizome/tuber, 11 species of fruits, 9 species of shoot/stem, 7 species of flowers are used as medicine in 52 different disease conditions. About 66 among these are used internally followed by 21 externally and 14 are being used both internal and external uses. Leaves were found to be the most frequently used plant parts in the preparation of medicine because collection and processing of leaves is easy, and does not damage the plant substantially as compared to the collection of roots or the whole plant. Most of the ethno botanical studies also confirmed that leaves are the major portion of the plant used in the treatment of diseases.

Overlapping between food and medicine is well known in traditional societies[32] and represent an often neglected field in ethno-pharmaceutical research.[33] No clear dividing line between food and medicinal plants usually exists, especially in indigenous and local traditions. Food can be used as medicine and vice versa. Still certain wild edible plants

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are used because of their assumed health benefits and thus can be called medicinal foods.[34]

Table 1: Therapeutic uses of wild edible vegetables

SN	Botanical name & Family	Part used as vegetable	Name of ailment	Route	Method of use
1.	*Abrus precatorious* L (Fabaceae)	Leaves	Burning of skin.	E	Leaf juice mixed with castor oil is applied.
			Cough	I	Two tablespoon of leaf juice taken twice daily after meals for six days
2.	*Acmella paniculata* (DC) Jansen (Asteraceae)	Leaves	Stomachache	I	One tablespoon of leaf juice is taken after meals, twice daily for five days.
3.	*Adhatoda zeylanica* Medic. (Acanthaceae)	Leaves, Flowers	Dysentery	I	Juice of two mature leaves is given thrice daily before meals for three days.
4.	*Alpinia galanga* (Linn.) Willd. (Zingiberaceae)	Rhizome	Bronchitis	I	Half cup of rhizome juice is given once daily after meals for ten days.
5.	*Alternanthera sessilis* (L.) R. Br. ex DC. (Amaranthaceae)	Leaves, Young shoot	Eye diseases	E	Leaf juice is used.
			Stomachache	I	Leaf juice used internally.
			Skin disease	E	Fresh leaf paste is applied on affected part.
6.	*Amaranthus spinosus* (Amaranthaceae)	Leaves Young shoot	Kidney stones	I	Young tender shoots are used as medicine
			Indigestion	I	Decoction of fresh leaves and stem are taken orally twice a day for three days.
			Snake bite	E	Root paste is used
7.	*Amaranthus viridis* Linn. (Amaranthaceae)	Leaves /Young shoot	Scorpion sting	E	Leaf paste is used externally as an antidote.
			Eye problem	E	Young tender shoots are used
			Toothache	I	Decoction of the herb is used as mouth wash.
8.	*Amorphophallus bulbifer* (Schott) Blume (Araceaea)	Tuber, Tender shoot	Piles	I	About 100 g tuber is boiled and taken with rice twice daily for a month
9.	*Amorphophallus commutatus*	Rhizomes	Piles	I	Rhizome is used.

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	(Schott) Engl. Dc. (Araceae)		Mouth diseases	I	Rhizome washed with water, boiled and used.
10.	*Arisaema tortuosum* Schott (Araceaea)	Tuber	Piles	I	About 50 g of tuber is boiled and taken with rice twice daily for a month
11.	*Asparagus racemosus* Willd. (Liliaceae)	Tuber	Dyspepsia and diarrhea	I	The root is boiled in milk and milk is administered
12.	*Bamboosa balcooa* Roxb. (Poaceae)	Young culms	Insect bite	E	Young culms are used
13.	*Basella alba* L. (Basellaceae)	Leaves	Piles	E	Leaf paste is applied.
			Headache	E	The mucilaginous liquid obtained from the leaves and tender stalks of plants is used.
14.	*Bauhinia variegata* L. (Caesalpinaceae)	Flowers	Dysentery	I	Dried buds are useful.
15.	*Beta vulgaris* Linn (Chenopodiaceae)	Tender shoot	Jaundice	I	About 50 g of tuber is boiled and taken with rice two times a day for ten days
16.	*Boerhavia diffusa* L. (Nyctaginaceae)	Leaves	Cough	I	Leaves are used internally
17.	*Bombax ceiba* L. (Bombacaceae)	Flowers	Haemorrhoids	I	Dry flowers are boiled with poppy seeds, goat milk, sugar and given three times in a day.
18.	*C. mimosoides* L. (Papillionaceae)	Leaves, roots	Diarrhea	I	Decoction of root is given.
19.	*Calamus tenuis* Roxb. (Arecaceae)	Young Culm,	Stomachache	I	Young stem is taken internally
20.	*Calophyllum apetalum* Willd. (Clusiaceae)	Leaves	Eye diseases	E	Leaves are soaked in water and applied to inflamed eyes.
21.	*Capparis zeylanica* L. (Capparidaceae)	Fruit	Ear diseases	I	Juice of fresh fruit is dropped into the ear to kill worms.
22.	*Cardiospermum helicacabum* L. (Sapindaceae)	Leaves	Piles	I	Decoction of leaves and root is given orally.
			Joint pain	I	Leaves are ground with hot water and taken orally twice a day for two days.

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23.	*Cassia auriculata* L. (Caesalpinaceae)	Flowers	Diabetes	I	Flower powder mixed with honey or decoction is given.
24.	*Cassia fistula* L. (Caesalpinaceae)	Flowers	Stomach problems	I	Decoction of flowers is used.
25.	*Cassia tora* Linn. (Caesalpinaceae)	Leaves	Ringworm	E	Leaf paste is applied.
			Jaundice	I	Five tablespoon of leaf juice is given once daily after meals for 15 days.
			Tumor	E	Seed powder mixed with cow urine is applied.
			Fever	I	Decoction of the seeds is given.
26.	*Celosia argentea* L. (Amaranthaceae)	Leaves	Snake bite	I	Ash obtained from root is used as an antidote.
			Skin diseases	E	Root powder with honey is applied.
27.	*Centella asiatica* (L.) Urb. (Apiaceae)	Leaves	Abscess and carbuncles	E	Leaf paste is applied for quick healing.
28.	*Chenopodium album* L. (Chenopodiaceae)	Young Leaves, tender shoots	Hookworms	I	Oil obtained from seeds is used internally to expel hookworms.
			Dizziness	I	Young tender shoots are used.
			Dysentery	I	Two tablespoon of leaf juice thrice daily after meals.
29.	*Chorchorus oliotorus* L. (Telicaceae)	Leaves	Anaemia	I	The leaves are good source of vitamin 'A' and rich in iron. Used to overcome anemic diseases.
30.	*Cissus quadrangularis* Linn. (Vitaceae)	Tender stem, Leaves	Joint pain	I	About 25 g of boiled stem taken with meal, once daily for ten days.
31.	*Citrullus colocynthis* (Cucurbitaceae)	Fruit	Head ache	E	Ripe fruit is rubbed by the bare foot.
			Arthritis	E	Ripe fruit is rubbed by the bare foot
			Diabetes	I	Seeds of pomegranate are left overnight in the fruit of citrullus and taken in

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					empty stomach.
32.	*Cleome monophylla* L. (Capparaceae)	Young leaves	Swellings	E	Leaf juice is used.
33.	*Clerodendrum colebrookianum,* (Verbaceae)	Leaves	Blood pressure	I	The leaves are eaten as vegetable to normalize high blood pressure
34.	*Clerodendrum indicum* Linn. (Verbenaceae)	Tender shoot	Cough	I	Three fresh mature fruits taken directly with lukewarm water twice daily for seven days.
35.	*Coccinia grandis* (L.) Voigt (Cucurbitaceae)	Fruit	Mouth diseases	I	Young, raw fruits are eaten.
			Piles	I	Juice extracted from the leaves is taken orally once a day for one month.
36.	*Colocasia esculenta* (L.) Schott. (Araceae)	Whole plant (except flower)	Otorrhoea	I	Juice of petiole is dropped into ears of children.
			Rheumatism	E	Tubers are made hot and applied to painful parts.
			Joint pains	E	Roasted petiole is applied in the form of plaster for a week.
			Galactogenesis	I	About 200 ml, infusion of petiole mixed with 250 ml cow milk is prescribed once a day for three days after child birth to promote secretion of breast milk.
37.	*Commelina benghalensis* L. (Commelinaceae)	Leaves	Diarrhea	I	Leaf powder mixed with warm water is given orally.
		Tender shoot	Earache	E	Two drops of leaf juice is applied on affected ear, once daily for seven days.
38.	*Crataeva nurvala* Buch. Ham. (Capparidaeae)	Tender shoot	Gastritis	I	About 50 g of boiled shoot is taken with meals twice daily for ten days
39.	*Cucurbit pepo* L. (Cucurbitaceae)	Fruit	Tapeworms	I	About 50 g of fresh seeds mixed with sugar or honey, taken as food for a day.
40.	*Curculigo orchioides* Gaertn.	Tuber	Asthma, jaundice and	I	Powder of tuber and equal

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	(Hypoxidaceae)		diarrhea		amount of sugar are mixed in one glass of milk and used.
41.	*Curcuma amada* Roxb. (Zingiberaceae)	Rhizome	Gastritis	I	Two tablespoon of rhizome juice twice daily after meals for five days
42.	*Curcuma angustifolia* Roxb. (Zingiberaceae)	Rhizome	Swellings, bone fracture	E	Rhizome juice is rubbed on swellings of the body and paste is used in healing fractured bone
43.	*Cyanotis cristata* (L.) D. Don (Commelinaceae)	Leaves	Skin diseases	E	Leaf paste is used.
44.	*Cycas pecitnata* Griff. (Cycadaceae)	Tender leaves	Gastritis	I	Three tablespoon of leaf juice is used twice daily after meals for 5 days
45.	*Digera muricata* (L.) Mart. (Amaranthaceae)	Leaves	Constipation and urinary disorder	I	Tender shoots and leaves are used
46.	*Dioscorea alata* Linn. (Dioscoreaceae)	Bulbils	Piles	I	Tuber powder is used
			Eye diseases	I	Tuber powder is used
47.	*Dioscorea bulbifera* L. (Dioscoriaceae)	Flowers	Diarrhea	I	Tuber powder mixed with butter is given.
			Piles	I	The roasted tuber mixed with ghee and sugar candy is used.
48.	*Dioscoria pentaphylla* L. (Dioscoriaceae)	Inflorescence	Eye diseases	I	Inflorescence is useful
49.	*Drymaria cordata* (L) Roem & Schult. (Caryophyllaceae)	Young stem	Fever	I	Whole plant is used
			Sinusitis	E	Two drops of warm leaf juice is used as nasal drops
			Skin diseases	E	Whole plant is used for external application.
50.	*Embelia drupacea* (Dennst.) M.R. & S.M. (Myrsinaceae)	Tender leaves	Toothache	I	Root bark is used.
			Sore-throat	I	Decoction of leaves is given orally.
51.	*Emilia sonchifolia* (L.) DC. ex. DC. (Asteraceae)	Leaves	Eye disease	I	Leaf juice is used
52.	*Hedyotis scandens* Roxb. (Rubiaceae)	leaves,	Gastritis	I	Stem is used internally.
53.	*Hibiscus sabdariffa* L. (Malvaceae)	Leaves	Dysentery	I	Leaves are used

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54.	*Homalomena aromatic* Roxb. Schott. (Araceae)	Leaves, Tuber	Joint pain	E	Petiole paste is applied on the affected parts, twice daily for a month.
55.	*Hydrocotyl javanica* Thumb. (Apiaceae)	Whole plant	Dysentery	I	Leaves are used
56.	*Hydrocotyle sibthorpioides* Lam. (Apiaceae)	Leaves	Dysentery	I	Two tablespoon of leaf juice is used twice daily after meals for six days.
57.	*Hydrolea zeylanica* (L.) Vahl. (Hydrophyllaceae)	Tender leaves	Swellings	E	Leaf paste applied as a poultice.
58.	*Ipomea aquatica* Forsk. (Convolvulaceae)	Young shoot	Jaundice	I	Leaf juice is used.
59.	*Ipomoea nil* (L.) Roth (Convolvulaceae)	Leaves	Piles	E	Leaf paste is applied externally.
60.	*Justicia adhatoda* Medik (Acanthaceae)	Flower	Tuberculosis	I	Large dose of fresh leaf juice is used.
61.	*Lagenaria siceraria* (Cucurbitaceae)	Fruit	Burning micturition	I	Fruit juice is administered along with lime juice.
		Young leaves	Cough, fever	I	Young leaves are used
62.	*Lasia spinosa* (L) Thw, (Araceae)	Young leaves, Tubers	Piles	I	Root and leaves are used.
			Cut and injury	E	Leaf paste is used on as haemostatic.
			Piles	I	About 50 g boiled rhizome is taken with salt and mustard oil, once daily for 15 days
			Rheumatism	I	The plant juice is used.
63.	*Leea indica* (Burm.f.) Merr. (Leeaceae)	Roots	Diarrhea and dysentery	I	Juice of young leaves is given orally.
64.	*Leucas aspera* (Willd.) Link. (Lamiaceae)	Leaves	Sinusitis	I	One drop of leaf juice is used as nasal drop once daily for six days
			Jaundice	I	Leaf juice is used
			Fever, cold and cough	I	Leaf juice is used
65.	*Lippia geminata* H.B.&K. (Verbenaceae)	Leaves	Conjunctivitis	E	One drop of leaf juice is applied once daily for six days

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66.	*Luffa acutangula* (Cucurbitaceae)	Fruit	Leprosy	E	Powdered leaves are mixed with garlic and applied locally.
67.	*Madhuca longifolia* (Koen.) Mac. (Sapotaceae)	Flowers	Cough	I	Decoction of flowers is useful.
			Impotency	I	Flowers mixed with milk are useful in impotency due to general debility.
68.	*Marsilea minuta* Linn. (Marsileaceae)	Tender shoot and leaves,	Urinary problems	I	Leaves are used for urinary troubles.
			Hemorrhage	E	Crushed plant with salt is applied over abdomen to cure hemorrhage.
69.	*Momordica charantia* (Cucurbitaceae)	Fruit	Diabetes	I	Fruit juice is used
70.	*Momordica dioeca* Roxb. exWilld. (Cucurbitaceae)	Fruits	Piles.	I	Tubers are used internally.
			Snake bite	E	Tuber powder applied in the form of paste over ulcers caused by snake bite.
71.	*Moringa oleifera* Lam. (Moringaceae)	Young leaves	Eye diseases	E	Used in catarrhal affections
72.	*Murraya koenigii* (L.) Spreng. (Rutaceae)	Leaves	Dysentery	I	Tender leaves are eaten raw.
			Gastritis	I	Three tablespoon of leaf juice is used once daily after meals for five days.
73.	*Nyctanhes arbor-tristis* Linn. (Nyctaginaceae)	Tender shoot	Malaria	I	Half a tea cup of leaf juice once daily after meals for 10 days.
74.	*Olax scandens* Roxb. (Olacaceae)	Leaves	Headache	E	Boiled leaves are tied in the forehead for two times.
75.	*Oroxylum indicum* (L.) Vent. (Bignoniaceae)	Young pod	Stomachache	I	Young fruits are used as carminative and stomachic.
76.	*Oxalis corniculata* Linn. (Oxalidaceae)	Whole plant,	Dysentery	I	Whole plant is used.
			Headache	E	Leaves are used
			Fever	I	Leaves are used
77.	*Oxalis corymbosa* L. (Oxalidaceae)	Whole plant	Scurvy	I	Whole plant is used

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78.	*Paedaria foetida* Linn. (Rubiaceae)	Leaves	Gastritis	I	Four tablespoon of leaf juice once daily after meals for a week
79.	*Pedalium murex* L. (Pedaliaceae)	Leaves	Gonorrhoea	I	Leaf powder is given with milk.
80.	*Persicaria microcephala* (D. Don) H. Gross (Polygonaceae)	Leaves	Wound	E	Paste of leaf is applied on the affected parts twice daily for three days.
81.	*Physalis peruviana* Linn. (Solanaceae)	Leaves	Stomachache	I	About 25 g of boiled tender shoots are taken with meal, once daily for five days
82.	*Pogostemon plectranthoides* Desf. (Lamiaceae)	Young shoot	Insect bite	I	Decoction is given orally in swelling due to insect bite.
83.	*Portulaca oleracea* L. (Portulacaceae)	Whole plant	Skin diseases	E	Leaf paste is applied
			Swellings	E	Leaves are used in the form of poultice for abscesses and swellings
			Earache	E	Two drops of leaf juice is applied on affected ear, twice daily for seven days.
84.	*Portulaca quadrifida* L. (Portulacaceae)	Whole plant	Swellings	E	Leaves are used as a poultice for abscesses and swellings
			Toothache	I	Plant juice is used.
			Earache	E	Two drops of leaf juice is applied on affected ear, twice daily for seven days.
85.	*Radermachera xylocarpa* (Roxb.) K. Schum.(Bignoniaceae)	Young fruits	Skin diseases	E	Fruit powder is applied externally.
86.	*Rivea hypocrateriformis* (Desr.) Choisy (Convolvulaceae)	Leaves	Skin diseases	E	Leaf paste made with camphor and butter it is used as ointment.
87.	*Smilax zeylanica* L. (Smilacaceae)	Tender leaves	Rheumatism	I	Leaf powder used.
88.	*Smithia sensitive* Ait. (Papillionaceae)	Leaves	Headache	I	Leaf juice is used

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89.	*Sonchus wightianus* DC. (Asteraceae)	Young leaves	Swellings	E	Leaf paste is applied
90.	*Tamarindus indica* L. (Leguminosae)	Young leaves	Anthelmintic	I	Decoction of leaves is given to children
			Fever	I	Leaves are used
91.	*Teramnus labialis* (L.f.) Spreng. (Fabaceae)	Tuber	Fever	I	Tuber paste is used.
92.	*Trianthema decandra* L. (Aizoaceae)	Leaves	Asthma	I	Leaf juice is used.
			Rheumatism	I	Leaf juice is used.
93.	*Trichosanthes tricuspidata* Lour. Fl. (Cucurbitaceae)	Fruits	Asthma	E	Fumigation of fruit is given
			Ear-ache	E	Fruit is well ground in coconut oil, boiled and used.
94.	*Trigonella foenum-graecum* Linn. (Papilionaceae)	Leaves	Dysentery	I	Seeds are roasted, powered and given in the form of infusion or decoction.
95.	*Vitex negundo* Linn. (Verbenaceae)	Tender leaves	Malaria	I	About 60 g leaves are boiled in 300 ml water till the quantity becomes half and administered twice daily after meals for fourteen days.
96.	*Xanthium strumarium* Linn. (Asteraceae)	Tender leaves	High blood pressure	I	About 25 g of boiled shoots taken with meal, twice daily for twenty days
97.	*Zingiber zerumbet* (Linn.) Smith (Zingiberaceae)	Rhizome	Dysentery	I	Two tablespoon of rhizome juice is taken after meals for five days.

I - Internal, E - External

CONCLUSION

Edible and medicinal plants can provide healthy alternatives to highly processed foods and pharmaceuticals. The present review indicates that regular use of wild edible vegetables is helpful in prevention and management of wide range of disease conditions. So, there is a need for documentation and protection of this indigenous knowledge which can be achieved through the involvement of local communities. Since the uses are based on observation and ethno-medicinal knowledge, scientific studies of all these herbal drugs are highly desirable to establish their efficacy for safe use.

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