

PORTULACA OLERACEA L. — A GEM OF ALIENS IN INDIA

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Portulaca oleracea L., a plant of considerable ethnobotanical reputation has evoked great interest among scientists of different disciplines. The present attempt is a synthesis of review of literature and field experience to disclose its various attributes especially those having beneficial implications. Although an exotic element, it has thoroughly naturalised in various topographical climatic regions in India and has developed an intimate relation with her people. To most of the tribes in India this plant is mainly a vegetable and has vast medicinal value. The plant has ornamental value and being rich in minerals can be used as a manure. On overfeeding it proves harmful to animals due to high oxalic acid content. Excessive use of this plant as a manure escalates soil salinity due to high potassium content and interferes with crop yield as a troublesome weed.

Keywords: Anthelmintic; Antidysenteric; Ethnobotany; Manure; Ornamental Value; *Portulaca oleracea*; Soil salinity.

Introduction

Portulaca oleracea L., a plant belonging to the family Portulacaceae and the order Caryophyllales representing the subclass Caryophyllidae, is an exotic element in India with nativity probably in North Africa¹ and Europe². This annual herb was probably introduced along with vegetable seeds carried by early explorers in the 15th Century and were found all over India and other Island countries as Maldives^{3,4}. Soon after introduction it dispersed in nooks and corners of tropical and subtropical regions and came in intimate contact with the people so as to gain entry into Indian tradition.

Materials and Methods

The information served in this paper about various uses of the *Portulaca oleracea* L. has emanated from synthesis of empirical and interpretative approaches involving exhaustive survey of pertinent literature, field observation, interview with villagers, tribals, practitioners of indigenous and traditional medicines, homoeopathy etc. The truth and rationality of an information from one source was judged on the basis of comparison with the information gathered

from another source. This investigation is a part of a work initiated in 1990 on ethnopharmacognosy of some less known but traditionally important plants.

Literature review

Earliest record of scientific work on *P. oleracea* dates back to Linnaeus⁵ who triggered its inclusion in Floras and Taxonomic literatures. In addition to a review⁶, contributions to the taxonomy of the species in the frame work of its family have been received in terms of cytogenetics⁷, palynology⁸, anatomy⁹, systematics, anatomy and chemistry¹⁰, SEM studies on seeds¹¹. Cytological and morphological studies¹², leaf anatomical studies¹³ and chemical investigation¹⁴ have added much to the taxonomic knowledge. It was accommodated in the Group III of the classification proposed by Shoreland¹⁵ since the seed fats contain palmitic, oleic and linoleic acids as major components.

Embryological investigation showed that the development of functional megaspore 2-nucleate stage has starch grains¹⁶. The development of male gametophyte is of normal type and the shedding stage of pollen grain is

3-nucleated¹⁷. Persistent epidermis, fibrous endothecium, ephemeral middle layer and binucleate glandular tapetum have been observed¹⁸. The first record of the medicinal use of this plant can be traced back to Kirtikar and Basu¹⁹. From Jamaican folklore *P. oleracea* is known to be reputed for the treatment of cardiovascular diseases²⁰. It was further examined by Feng *et al.*²¹ for the pharmacologically active compounds. The species is known to have antimicrobial activity²² also.

There are reports about some agronomic studies²³, food chemistry²⁴ and economic aspects²⁵. However an exhaustive ethnobotanical work concerning the plant is lacking particularly in the context of India. Much work has also been done on the role of this herb as a weed and its relation with herbicides²⁶. Action of herbicides on *Portulaca oleracea* was evaluated by Giannopolitis²⁷. *P. oleracea* was found to be the most troublesome weed. Studies on weed seed population dynamics in crop rotation on irrigated soil was made by Menges²⁸.

Taxonomic discourse

Portulaca oleracea L., Sp. Pl. 445. 1753; Dyer in Hook. f., *Fl. Brit. India* 1 : 246, 1847; Cook, *Fl. Pres. Bombay* 1 : 72, 1901; Prain, *Bengal Pl.* 1 : 240. 1903 (Rep. ed. 1 : 161. 1963) and in *Rec. Bot. Surv. India* 3 (2): 175. 1905; Dunn in J.S. Gamble, *Fl. Pres. Madras* 1. : 47. 1915 (Rep. ed. 1957); *Geesink in Blumea* 17: 292. 1969; Ramamoorthy in Saldhana and Nicolas, *Fl. Hassan, Dist. Karnataka* 100, 1976; Babu, *Herb. Fl. Dehra Dun* 77. 1977; Chandrasekaran in Nayer and Henry, *Fl. Tamil Nadu* 1 : 24. 1983; Sharma *et al.*, *Fl. Karnataka* 16. 1984. Fig. 1.

English Name : Common Purslane

Indian names: Sanskrit : Brihalloni,

Lonamal, Lonika; Hindi : Khursa, Lunia, Kulfa; Bengali : Baraloniya; Marathi : Bhuighoti, Kuraf; Gujarati : Motiloni, Ghol; Telegu : Pappu Koorra, Peddapayilikura, Ganga-pavilikura; Tamil : Karikeerai. Paruppukirai, Pullikirai; Kirai;Kkanada : Dooddagoonii soppu; Malayalam : Kariचेcheera; Oriya : Purumisag; Assameese : Noniya; Punjabi : Lonak, Kundar.

A succulent ascending or prostrate annual herb; *stem* roundish, often tinged with purple, glabrous, nodes swollen; *leaves* alternate or sub-opposite, often terminally approximated, simple, 2-11 mm x 2-9 mm, succulent, oblong, obtuse or rounded, entire, cuneate at base, sessile, stipulate; *inflorescence* cymose of 2-3 floral clusters; *flower* small, actinomorphic, hypogynous, without disc, bisexual; *perianth* biseriata, upto 6 mm long; *sepals* 2, anteroposterior 2.5 mm long, basally connate, often caducous and imbricate; *petals* 5, distinct, connate basally, 2-3 mm long; *stamens* exceeding the number of petals, antipetalous, adnate to petals at the base; *anthers* 2-celled, introrse, dehiscing longitudinally; *carpels* 2 with a pair of stigmas, united into an one-celled half-inferior ovary sunk into torus; *ovules* many, campylotropous, in free central placentation; *fruit* a capsule, dehiscing circumscissilely, with 2 apical valves; *seed* albuminous, reniform, with copious endosperm surrounded by embryo, generally milky white in colour becoming brown on maturity.

Field Note : Common in moist wastelands, along railway tracks, roadside, river banks, sea-shore and agricultural fields, etc.

Fl & Fr. : March-November.

Distribution: Occurs throughout India as a weed, ascending upto an elevation of 1,500m

in the Himalayas; Cosmopolitan, mostly in warmer parts of the world with primary and secondary centres in South Africa and Australia respectively.

Floral formula : $K_2C_5A_xG(2)$

Chromosome number : $x = 54$

Specimens examined :

Gujarat : Palampur, V. Singh 5312 (CAL).

Maharashtra : Pawati hill, Poona, M.P. Ansari 64366 (CAL).

Madhya Pradesh : Orchha, Tikamgarh, G.P. Roy and K. Kishore 44851 (CAL).

Rajasthan : Badmar, A.N. Singh 7070 (CAL).

Uttar Pradesh : Bolpur, Gonda, K.K. Khanna and R. Sharma 37164 (CAL).

Tamil Nadu : C. Sudharsan 427 (CAL).

Orissa : Gupteswar, G.V.S. Rao 30403 (CAL), Balasore, Banerjee 201; Panposh, Sundargarh, Mukherjee and Namhata 1806.

Andaman and Nicobar Islands : N. Bhargava 2384 (CAL).

West Bengal : Calcutta, Banerjee 199; Kamarkundu, Hoogly, Banerjee 204; Bongaon, 24-Parganas, Banerjee 177; Midnapore, Banerjee 302; Burdwan, Banerjee 192.

Medicinal uses

The root, stem and leaves of the plant are used in medicine. It has been cited in both Ayurvedic and Homoeopathic systems.

- (a) The herb is considered to possess refrigerant, vulnerary, antiscorbutic, aperient and diuretic properties; the diuretic action is probably due to overwhelming content of potassium salts. It is useful in treatment of scurvy, diseases of liver, spleen, kidney and bladder. It is also prescribed to encounter

cardiovascular diseases, dysuria, haematuria, gonorrhoea, dysentery, sore nipples and ulcers of the mouth. The juice of the plant is sometimes used in earache and toothache. Herb is used in bruns²⁹. In Homoeopathy, the herb is used to increase the flow of gastric juice. It is also used as a blood purifier^{19,30,31}. The aqueous and benzene extract of the herb is active against gram-negative bacteria³². The herb is used in fever³³ and to protect the skin from prickly heat and burning sensation.

- (b) The paste of leaves is applied to burns, scalds, swellings and erysipelas. The leaves and tops are employed in haemostatic poultices. Leaf extract with black pepper is used in incontinence of urine. Leaves are also antipyretic³⁴.
- (c) Seeds are vermifuge³⁵, demulcent, diuretic, antidiarrhoeal and are effective in healing of burns and scalds.
- (d) Local application of the stem juice can ameliorate burning sensation of hands and feet³⁶.

Edible uses

Leaf of *P. oleracea* L. is used as a vegetable by tribal communities of Arunachal Pradesh in North-Eastern India, Shahjanpur, Uttar Pradesh and also in other parts³⁷. Leaf juice is used in quenching thirst. The roasted seeds are often eaten. Herb is consumed as salad and in soups³⁸. Stem is used as a vegetable³⁹. Fleshy stems are pickled. They are also dried and preserved for use in time of scarcity. The herb is a good source of fodder⁴⁰.

Ornamental uses

The handsome nyctinastic foliage and beautiful yellow flowers borne on reddish or purplish stem make the plant very attractive

when grown in gardens as a hedge or as a pot herb.

As a manure

P. oleracea L. being rich in minerals, can be used as a manure in the crop fields.

Detrimental effects

In the experimental trials, however, heavy ingestion of this plant proved toxic and even fatal to the animals due to oxalic acid poisoning⁴⁰. In addition to that presence of calcium oxalate crystals in profusion accounts for the irritating action of fresh stem and leaf on the skin. Furthermore, prolonged use as a manure is likely to increase the salinity of soil due to high potassium content of the plant. The plant becomes a troublesome weed in some places as it is very prolific in setting seeds, which retain their viability for over 30 years⁴¹.

Discussion

About 100 species of *Portulaca* are reported from the world, only six of which viz., *P. oleracea*, *P. wightiana*, *P. quadrifida*, *P. grandiflora*, *P. pilosa*, *P. tuberosa* occur in India.⁴² Although other species are familiar, *P. oleracea* is harnessed for use as a source of food, fodder, medicine and aesthetic pleasure. This plant is ingrained in some of Indian folklores. This species is taxonomically interesting since it has close affinity with Basellaceae and Aizoaceae. *Portulaca* is very similar to *Lewisia* of Aizoaceae, particularly in the nature of their stamens. It is also related to other members of Caryophyllales. This non-tanniferous species like other members of the taxon except Caryophyllaceae and Molluginaceae is characterised instead of anthocyanins by betalin which is a flavonoid pigment with heterocyclic nitrogen containing aromatic rings⁴³.

Two varieties have been distinguished

under this species viz., *P. oleracea* var. *oleracea*, the common wild variety (syn. var. *sylvestris*) and var. *sativa* the cultivated one. The latter is more upright and better in quality and yield. However, recent taxonomic work⁴² recognised two varieties viz., var. *linearifolia* and *oleracea* from this country. There are several garden races grown in Europe of which green, the golden and the large-leaf goldens are more important⁴⁴.

The plant exists in various topographical and climatic regions of India and even ascends to an elevation of 1,500 m in the Himalayas. In view of its multifarious uses and ease of propagation, its cultivation may be made in larger areas, as also along house premises. A thorough scientific evaluation, characterisation and cultivation is certain to boost this species to shape itself into a very successful and potential entity in commercial sphere.

This plant probably evolved in habitats of intermittent aridity with the ability to concentrate ambient CO₂ in the bundle sheath cells by virtue of such structural adaptation as Kranz anatomy⁴⁵ and biochemical specialization as C₄ metabolism⁴⁶.

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