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Studies on bio crystals and its extraction from the plants *Oxalis* growing in Jharkhand

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Abstract-The presence of crystals of various shapes and size are common in the ground cells of mid-rib among the four different species of *Oxalis*. Crystals were confirmed by X-ray diffraction. For aqueous extraction of crystals plant petioles and leaves were used. The studies indicate that dietary oxalate crystals are harmful, but by the ethnomedicinal information; crystals may be used for mankind as Omniderm cream or gel for various external uses

Key words: Crystals, Ethenomedicinal, Extraction, *Oxalis*, Oxalate

INTRODUCTION

There are several mechanisms have been described by which plants synthesize oxalic acid.[1, 2] The oxalic acid reacts with cations resulting in the formation of different crystals of oxalate.[3] Synthesis of oxalic acid crystals has been identified and reported from various researchers. Herman Boerhaave (1745) first time identified oxalic acid derives from the genus of the Oxalidaceae family and later isolated by Francois Pierre in 1773 from the plant *Oxalis acetosella*.[4] Crystals are the products of cellular metabolic processes, which deposited in vacuoles and cytoplasm.[5] Seventy-five percent of flowering plants make one or more kinds of the crystals.[6] The plant synthesized both insoluble and soluble oxalate.[7] The Plants synthesized water soluble crystals has been reported like *Averrhoa carambola* L, *Oxalis tuberosa*. Raphides are insoluble oxalates those are produce crystalline needles of calcium oxalate. Plants also produced Oxalic acid is like *Spinacia oleracea*, *Rumex acetosa*, *Apium graveolens*, *Daucus carota*, *Brassica oleracea*.[8] Biological roll of Calcium oxalate crystal formation in plants is tissue calcium regulation, protection from herbivore, and metal detoxification.[9, 10]

Oxalis is considered as the largest genus in the wood-sorrel family Oxalidaceae consisting of approximately 900 known species.[11] The genus occurs throughout the world, In India; it is represented by 10 species out of which 8 species are known to occur in Peninsular India.[12,13] Among them 4 species were recorded from Jharkhand.[14] The genus *Oxalis* is a small fast growing herb also considered as weed. It prefers damp condition and is widespread, successfully grows in lawns, sterile lands, waste lands, gardens etc. It is especially troublesome in pots growing in greenhouses.[15]

MATERIALS & METHODS

The plants were collected from natural growing habitat of different species after survey of localities in

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during the year of 2021. Transverse sections of the shoot were cut by standard methods and observed under microscope OLYMPUS CH20, photograph were taken.

For aqueous extraction of crystals, petioles were collected washed and cut in small paces than boiled for 10 to 15 minutes in distilled water. The material was kept in oven for 35 to 40°C till crystal formation. The crystals examined under X-ray diffraction (Thermo Scientific™ ARL™ EQUINOX 100 X-ray).

RESULTS & DISCUSSION

Oxalate is a common bio mineral in plants, occurring as crystals of various shapes. Oxalate crystals are common in the ground cells of midrib among the four different species of genus *Oxalis* growing in Jharkhand namely *Oxalis corniculata, Oxalis debilis, Oxalis latifolia* and *Oxalis triangularis*. The crystals are either prismatic or druses, ordinary and unspecialized. Their distribution is not even among the four species. The prismatic crystals are of about 10µm in diameter and are observed in *O. debilis, O. latifolia* and *O. triangularis*. As far as druses crystals are observed in *O. corniculata* is up to 20 µm in diameter (Fig. 1-4). Crystals were confirmed by the different picks obtained by prepared sample. (Fig.5)

For aqueous extraction of crystals 100 gram petiole of *O. debilis,* or *O. latifolia* were collected and cut in small paces than boiled for 10 to 15 minutes in 100 ml. of distilled water the material was kept in oven for 35 to 40°C till crystal formation. (Fig.6). It observed that 100 gram petioles of *O. debilis* gives 5 to 6 gram crystals powder whereas *O. latifolia* and *O. triangularis gives* 3 to 4 gram of crystal powder and *O. corniculata* have low amount of crystal powder.

In diet supplement oxalate crystals are always treated as harmful effects but external use of calcium oxalate crystals may be beneficial for human mankind. By the Ethno medicinal information of Ranchi district of Jharkhand, different species of oxalis were used for skin disease, skin toner, skin infection, and hair therapy, it is also used as gum and mouth infection. The extract of crystals may be used as mentioned aliments. Extraction of crystals may be also used as Omniderm cream for external use.

Druses crystals are common in dicotyledons but relatively rare in monocotyledons, where they are almost entirely restricted to the Acorus, some Araceae. Although there are very few records of druses in the literature, in fact they are quite common in Acorus, especially in aerenchymatous tissues. styloids are usually found either in parenchymatous bundle sheath cells around vascular strands or in crystal idioblasts in adjacent mesophyll tissues, although, in Xanthorrhoea, the styloids in the leaf are frequently epidermal.

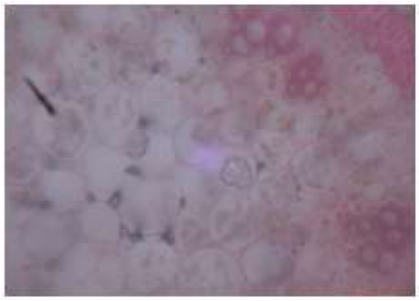

Fig. 1- Crystals of *Oxalis corniculata*

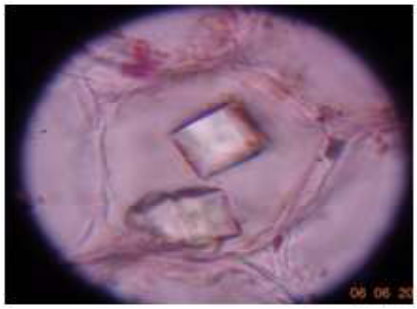

Fig. 2- Crystals of *Oxalis latifolia*

Fig. 3- Crystals of *Oxalis debilis*

Fig. 4- Crystals of *Oxalis triangularis*

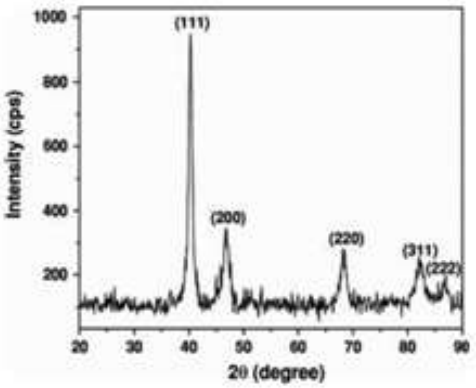

Fig. 5- XRD peaks of crystals

Fig. 6- Sediments of crystal powder

CONCLUSION

The plants *Oxalis* treated as weeds it grows very fast and have created interest among the local population. There are less scientific studies in this field, so it is urgent to proper conservation and equitable biological resources. The four species of *Oxalis* may be useful for human mankind.

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