Indian J. Pl. Genet. Resources **10**(2): 273-276, 1997

CONSERVATION OF ZINGIBERACEOUS PLANTS IN ORISSA

S. Behura

Regional Research Laboratory,
Bhubaneswar 751 013 (Orissa)

Key words : Conservation, Zingiberaceous plants

Species belonging to the family Zingiberaceae are of considerable economic importance. Turmeric (*Curcuma domestica*), mango ginger (*Curcuma amada*), ginger (*Zingiber officinale*), small cardamum (*Elettaria cardamomum*) and large cardamum (*Amomum subulatum*) are very important spices. These are also used in pharmaceutical and cosmetic industries. *Alpinia* oil has uses in perfumery, pharmaceutical, food and flavouring industries. In tribal areas plant parts of some Zingiberaceous species are used as carminative and an antidote to snakebites. Pharmaceutical studies in Zingiberaceous plants show that ginger rhizomes are effective for intestinal disorders (Krishnamurty and Sreenivasamurthy, 1956) and salivary secretion for stimulating the vasometer and respiratory centres (Ally, 1961), for relaxing the tracheae and ileal smooth muscles (Reiter and Brandt, 1985) and for lowering serum and hepatic cholesterol levels (Gujral *et al.*, 1978). Recent investigations also indicate that pungent principles of ginger rhizomes, such as gingerols and shagaols, have pharmacological actions (Shoji *et al.*, 1982, Suekawa *et al.*, 1984, 1986). In addition, antioxygenic effect of the rhizomes on food has been found (Du Bois and Tressler, 1943; Sethi and Aggarwal, 1952; Chipault *et al.* 1955, 1956, Kihara and Ingue, 1962; Fujio *et al.*, 1969).

There are some other species in Zingiberaceae family which have uses in pharmaceutical, dyes, cosmetics, condiments, food and flavouring industries as the rhizomes contain steroid, diosgenin, saponins, flavonoids, phenolics, iridoids, alkaloids and tannins. Zingiberaceous plants are available predominantly in South-East Asia. Ginger is cultivated in many tropical and subtropical countries. Major exporting countries are India (over 15,000 tonnes), Australia, Nigeria, Fiji, Taiwan and China (Turris *et al.*, 1987). In peninsular Malaysia about 22 genera and nearly 200 species of Zingiberaceae have been identified for conservation purpose and a Zingiberium has been developed at the Department of Biology, University of Pat, Malaysia (Ahmad and Rahman, 1991). Zhong Yi (1991) organised a Zingiberaceae workshop at Prince of Sangkla university.

In India the germplasm from Maharashtra, Kerala, Andhra Pradesh, Orissa and North-Eastern Hilly states have been exploited by ICAR, CSIR, State institutes and R & D activities. Agrotechnology and the method for extraction of oleoresin, curcumin etc. have been standardised. Orissa is considered as a major centre of Zingiberaceous plants. Orissa, University of Agriculture and Technology, Bhubaneswar has a research centre in pottangi (High Altitude Research Station) where work is going on mostly on ginger, turmeric and cardamum.

It seems that only a small fraction of the genetic & cytoplasmic diversity available in the germplasm of Zingiberaceous crops have entered the parentage of the present day advanced varieties. Hence there is an urgent need to collect and evaluate the germplasm for every crop. Intensive basic studies would be essential on adaptation mechanism of genotypes to moisture, diseases, soil and climatic stresses and on the biochemical and cytogenetical basis of their resistance to the biotic and abiotic factors so that the planned transfer of useful genes into the advanced varieties would be possible. For better yield the cultivars have to be up graded and the agrotechnology for each crop be standardised and at the same time the suitable crops should also be popularised. Considering the importance of this family the study has been undertaken in Regional Research Laboratory, Bhubaneswar. The study includes the germplasm collection and improvement aspects (quantitative and Qualitative). Collections were made from Nandankanan, Pottangi, Kashipur, Patia, Dhenkanal, Saptasajya, Astarang and Sorishiapada areas of Orissa. Besides, the *Cardamom sp.* was also procured from calicut, Kerala. Twenty species were identified and some were locally known as Krishna kedar, Garuda keder, Basu keder and Ram keder (having tribal medicinal use in snakebite) are maintained in the research garden at Regional Research Laboratory. Some identified species grown here are *Alpinia Calcarata, Zingiber cassumunar, Curcuma montana & Zingiber rubens.* Two improved varieties of ginger (**Suravi** and **Suprava**) and four varieties of turmeric (Armoor, Rama PTS-14 and Surama) were collected from Pottangi, HARS Koraput.

Introduction and cultivation of local turmeric ginger, *Curcuma amada* Parashukedar were started in 1994. Its plant height, tiller number, yield and chlorophyll content of leaf were recorded and hydrodistillation of root, rhizome and leaf of turmeric, ginger, *A. calcaratas, Z. cassumunar* and *C. amada* were done and the oil percentage were calculated.

Zingiber officinale (Ginger)

Two experiments were conducted on ginger. One on the intercropping with cinnamon and another in the field. Yield data showed the poor growth

of ginger and the oil percentage was recorded in rhizome (0.38 % in fresh), traces in roots and no oil in the leaf. Oil content and oleoresin of an improved variety of ginger (**suparva**) was 0.75 per cent (dry wt. basis) and 7 per cent respectively. Oleoresin of local ginger was 6 per cent.

Curcuma longa (Turmeric)

Turmeric plantation was done on 18th June 1994 and harvested during the month of January 1995. Rhizome yield varied from 210- 325 g/plant and per hectare yield was 11.74 t. Maximum oil content (1.32%) was recorded in dry leaves of turmeric and it varied from 0.812 to 1.85% and followed by rhizome (0.95% dry), and root (0.83% dry). The ratio of dry leaf to rhizome and root was 3:17:1 oil content and oleoresin of four improved varieties of turmeric were as follows; for Rasmi : 3 per cent and 11.1 per cent Ranga : 2.66 per cent and 8.7 per cent Rama : 2.77 per cent and 11.1 per cent and for Surama : 3.3 per cent and 15.1 per cent respectively. Oleoresin of local turmeric was 10 per cent.

Curcuma amada (Mango ginger)

Curcuma amada plantations were done on 11th June 1994 and harvested on 3rd June 95. Rhizome varied from 310-560 g/plant and the plot yield indicated 30.45t/ha. In *C. amada* rhizome oil content was maximum (0.34% dry) followed by root (0.08%) but in leaf it was in traces. Oleoresin content was 7.4%.

Zingiber cassumunar

In *Z. cassumunar* highest oil content was recorded in rhizome (1.05% dry) followed by root (0.94% dry) but no oil was found in leaf.

Alpina calcarata

In *A. calcarata* highest oil percentage was recorded in root and it varied from 0-.25-0.28% followed by rhizome (0.17- 0.25%) leaf (0.07 - 0.10%) and found traces in stem (Rath *et al.* 1994). Except ginger, turmeric, *C. amada, Z. cassumunar* and *Alpina* showed a good yield in the lateritic soil of Bhubaneswar. All the plant parts produced aromatic oils on hydrodistillation except the leaves of ginger and *Z. cassumunar*. The identification of chemical composition of the oils are yet to be studied. Considering the growth, biomass, oil yield and oleoresin content of Zingiberaceous plants in the introductory trials turmeric, *C. amada, Z. cassumunar* and *Alpinia calcarata* provided scope for further investigation to establish its economic potential. The future phytochemical investigation will be useful for industrial use of these oils. The

identification of unknown species may help in getting new sources of raw materials for food, beverage, cosmetics and pharmaceutical products.

ACKNOWLEDGEMENT

The author is thankful to Mr. N.C. Rout for helping in collection & identification of Plants.

REFERENCES

Ahmad and Rahman. 1991. Zingiberaceae workshop, Prince of Sanghla University, Hat Yai Yai hailand P 22 15-18th Oct.

Ally, M.M. 1961. Proc. Pan Indian Ocean Sc. congr. Karachi, Pakistan 1960 4th sectio G PP11

Chipault, J.R. 1955. Food Res. **20** : 443-448.

Chipault, J.R. 1956 : Food Res. **10** : 209-211.

De Bois C. W, D.K. Tressler. 1943. Proc. Inst. Foot technol, 202-207

Fujio, H. 1969. Nippon Shokulin Kogyo Gakki-Shi, **16**: 241-246.

Gujaral, S., H. Bhumra and M. Swaroop. 1978. Nutr. Rep. Int. **17**: 183-189.

Kihara, Y. and T. Ingue. 1962. Nippon Shokuhin Kogyo Galkai-Shi, **9**: 290-293

Krishnamurthy, K and V. Sreenivasamurthy. 1956. Bull Centrl. Food Technal Res. Inst. Mysore, **5**: 264-467

Rath, S.P., S.B. Sahoo and C. Srinivasulu. 1994. Ind. J. nat. Prod. **10**(1), 12.

Reiter, M. and W. Brandt. 1985. Arzneium Ferch. **35**: 408-414.

Sethi, S.C. and J.S. Aggarwal. 1952. J. Sci. Ind. Res. **B11**: 468-470.

Shoji, N.A. Iwasa, T. Takemoto, Y. Ishida, Y. Ohizumi. 1982. J. Phakra Sci. **71**: 1174-1175

Sinha, K.P., S.C. Sud and H.S. Bahga. 1974. Ind. Vet. J. **51**: 15-19.

Suekawa *et al.* 1986. A : Nippon Yakurigaku Zaeshi, **38**: 339-347

Turis, A. Van Beek, A. Maarten, Gerrit P. Posthumus, Hoang Lelyveid V. Phiet and T. Yen Bul. 1987. *Phytochem* **26**(11): 3005-30100.