crop under partial shade, in well-drained fertile soils and with assured irrigation during pre- and post-monsoon periods. It thrives well in different agro-ecological situations of Jammu with a temperature ranging from 5° to 35°C and annual rainfall ranging between 100-110 cm. It shows luxuriant growth with the advent of monsoon coupled with high temperature and high humidity. Maximum yields are obtained when the temperature during growth is around 28-30°C and an average humidity of 75 percent. Results show that it can grow successfully and produces quality leaves for at least three years. Best time for raising rooted cuttings is August-September with about 90-95 percent success. Shade is essential for raising nursery. Stem cuttings selected from healthy nematode free bushes 10-12 cm length, with terminal bud and a crown of 2-3 leaves are suitable. These become ready for transplantation in about 8-10 weeks. The first harvest of the crop is obtained after about 5 months of transplanting and subsequent harvests are done after every 2 months depending upon the crop maturation. The yield of the oil from shade-dried leaves varies from 2.5-3.0 percent. The crop yields about 2t/annum of dry leaves and about 50-60kg/ ha of oil. For encouraging commercial production, efforts are underway to develop high oil yielding varieties, low cost agro-technologies, harvest management, distillation technology for better recovery of oil, accessible market facilities to farmers and oil purification to meet the market standard. Its commercial cultivation will create employment avenues to rural communities, also providing scope for increasing oil production and hence reducing the imports.

Recent Trends in Spice and Herbal Industry

Veena Gupta
Senior Scientist, National Bureau of Plant Genetic Resources, New Delhi-110 012

Key Words: Spices, Herbs, Introduction

Indian spices and herbs are the prime sources of the fabulous wealth and prosperity. There are more than 100 plant species grown in India which accounts for approximately 8% of the global trade in these commodities. History of usage of spices and herbs goes back to 3000 BC when most of these plants were used for embalming, perfumery, poison antidotes, cosmetics and medicines. Great voyages of Vasco-de- Gama and Columbus resulted in the introduction of many spices and herbs including chillies, vanilla, cinnamon and many aromatic plants. Black pepper was the first to enter into international trade. As a result, spices and herbs of all kind are now available worldwide for sale in global market. India occupies the leading position in international trade as exporter while Japan, USA and European Union are the leading spice and herb importers.

Five species viz., black pepper, capsicum, cinnamon, ginger, turmeric and their derivatives accounts for the major international market share but there are many more in the list. China and Vietnam are the major producers and exporters of the star anise. Indian cardamoms are still considered to be of the superior quality in global market. India and Guatemala are the world's largest producers of cardamom. Cinnamon has been introduced in many tropical countries but commercial cultivations are confined to India, Indonesia, Srilanka and Malaysia. Cumin is another herb where India leads the market.

Realizing the importance of these plants, National Bureau of Plant Genetic Resources, New Delhi has made efforts in introduction of promising germplasm from source countries. These introductions have contributed more genetic variability in terms of yield potential and disease resistance. A Bulgarian cinnamon cultivar S-33, for high oil content and coriander-2 for more secondary branches, large umbel, bold and yellow green seed was introduced. In Cumin cv VC-19 for yield and cv Cumin-1 with bold seeds, resistant to wilt and *alternaria* blight was introduced. Ginger free from nematode infestation from Indonesia are few other examples.

Similarly in *Mentha piperata* (EC41911) procured from Russia with high herbage yield, 0.5% essential oil and 60 percent menthol content has been released

for cultivation. EC291748 in saffron from Italy and EC217012 in *Matricharia chammomila* from Romania for green herbage and high essential oil and *Thymus vulgaris* (EC207655) from USA as a good source of oil thyme and thymol. A large number of basil genotypes for different traits have been introduced from France. These include linalool genotypes EC176934, methyl-chavicol genotypes EC338781-338775 and 338778, methyl-cinnamate genotypes EC312264 and eugenol genotypes EC-282721. *Satureja hortensis* (EC328517) from Iran and *Pimpinella anisum* anethol rich lines (EC-22091) from France are among new introductions. Many of these are successfully adopted in the Indian agricultural system. National Bureau of Plant Genetic Resources, New Delhi has also entrusted with the responsibility of conserving this biological wealth. It has established a National Gene Bank which has a seed gene bank, a tissue culture repository and a cryo-bank. All the available germplasm of potential crops is being stored at national gene bank.

ABSTRACT

Potential Genetic Resources of *Salicornia*

Rahul Chaturvedi and Carl N Hodges
Seaphire International, 4230 E, Whittier Street, Tuscon, Arizona-85711, USA

Salicornia bigelovii an annual C3, leafless halophyte is a potential sea resource irrigated edible oil crop. Due to its highly salt tolerant nature, it is grown in coastal desert areas with direct seawater irrigation. *Salicornia* seed contained high level of oil (26-32 percent) and more or less similar to safflower and sunflower in edible qualities. Seed meal had 35 to 40% protein with 0.05 peercent saponins and could replace soybean meal used in poultry industry. Straw of *Salicornia* is rich in lignin and salt. It can be used in making fire logs, particle boards and paper. Straw is also used as animal fodder on blending with other fodder(s). At vegetative growth stage growing parts of plants are harvested and used as green vegetable and salad.

Based on decades of intensive research work done in Mexico, United States of America, Eritrea and other parts of the world, new varieties have been developed with seed yield potential of 2.5 to 2.8 tonnes per hectare. The performance of salicornia may further be increased with the development of hybrid varieties by exploiting male sterility system.

Looking into challenges from population growth, fast depletion of underground fresh water and shortage of edible oil, salicornia appears to be potentially valuable new oilseed crop for subtropical coastal desert areas of the world. Thus the possibilities of inbreeding and evolving these elite materials have to be explored.
