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ISS Newsletter

NEWSLETTER OF THE INDIAN SOCIETY FOR SPICES

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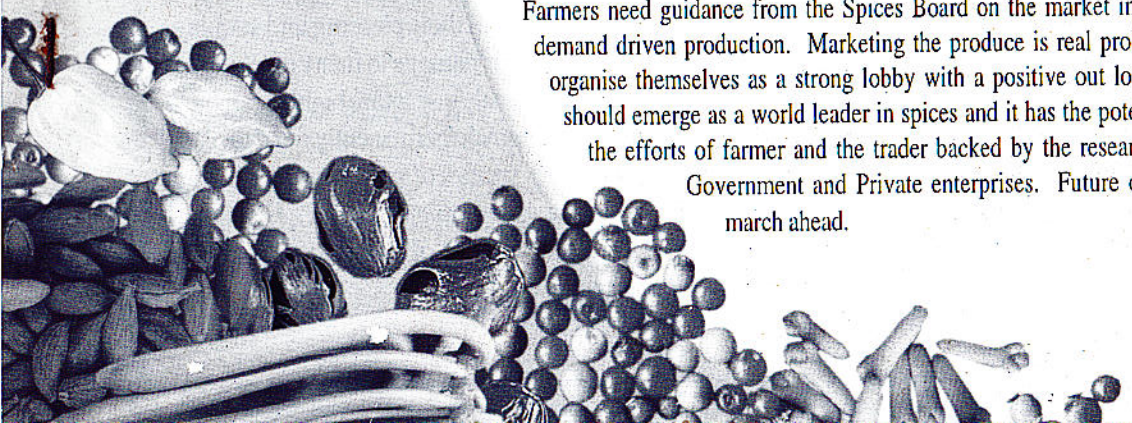
FROM THE PRESIDENT'S DESK

We are now in the beginning of Tenth Five Year plan, which envisages a target of 8% GDP growth rate. The erratic monsoon with rainfall down approximately by 33% will have a serious impact on all crops, especially plantation crops and spices. Prevailing market price of spices show a mixed trend. Cardamom rates are attractive and black pepper rates are moving up. The export of spices during 2001-2002 showed an increase of 6.1% in volume and 0.8% in value compared to previous year. The recently held International Pepper Community (IPC) meet at Sarawak on 25th September projected an overall production of black pepper for the year 2003 as 2,83,500 MT compared to 3,05,462 MT during the year 2002 and 2,00,496 during 2001. The research programme during Tenth plan should give a high priority to alleviate the biotic and abiotic stresses to break the yield barriers and focus on value addition. We need to exploit the opportunities in oil and oleoresin industry in spices in view of its gradual and steady increase in export.

The chronic low productivity levels of spice crops in India continue to be the major hurdle to become globally competitive. Biotic and abiotic stresses continue to be the major production constraints, which remain as big challenges to the scientific community. The prevailing drought and consequent possible set backs poses several questions. The present mindset of the farmers that these crops are rainfed has to change and find ways and means to improvise irrigation to make these crops sustainable. It is a challenge to the scientific community to come out with practical solutions, which are palatable to the farming community. Time is running out and farmers are becoming impatient. While reasonable technologies for management of foot rot and slow decline in black pepper have been evolved, virus diseases are emerging as new challenges. Spices Board is striving hard to increase the areas under vanilla in view of the attractive market potential. However, a great caution is necessary to nip in the bud, the new problems like *Phytophthora* caused bean rot. The recent report of virus problem in vanilla is disturbing. These challenges need to be taken as opportunities to reorient our programme to overcome these constraints. The problems especially biotic and abiotic stresses need to be tackled through both conventional approaches as well as cutting edge technologies like genetic engineering. The research needs are to be intensified on chillies and paprikas, specially related to quality parameters like pungency, colour and problem like afflatoxin, since the export demand of chillies is very high.

Farmers need guidance from the Spices Board on the market intelligence to resort to need based and demand driven production. Marketing the produce is real problem for the farmer. Farmers need to organise themselves as a strong lobby with a positive out look and liaise with the industry. India should emerge as a world leader in spices and it has the potential. This would be possible through the efforts of farmer and the trader backed by the research and developmental efforts both by Government and Private enterprises. Future of the spices is very bright and let us march ahead.

(Y.R. Sarma)



RETIREMENTS

Dr. P N Ravindran

Dr. P.N. Ravindran, the past President of ISS retired from ICAR service as Project Co-odrinator (Spices) on 30-04-2002. His contribution to the development of spices and the Indian Society for Spices are immense.

Dr. Ravindran started his career as Assistant Botanist at Central Plantation Crops Research Institute (CPCRI) Regional Station, Vittal in 1974. In 1976 he joined Regional Station of CPCRI at Calicut. From 1976 to 2002 he served ICAR in various capacities till his superannuation. He was the Head of Division of Crop Improvement and Biotechnology for 14 years and Project Coordinator (Spices) during 1999-2002. He established world's largest spices germplasm resources at Peruvannamuzhy, developed 7 new varieties and discovered 5 new taxa of *Piper*. He and his colleagues bagged the **ICAR team award in Horticulture Science** during 1994-96 for their contributions to Biotechnology of Spices. He was awarded **J.S. Pruthi award** thrice for the best research paper published in Journal of Spices and Aromatic Crops during the years 1997, 1998 and 1999. Dr. Ravindran has edited monographs on black pepper and cardamom and has over 160 research publications to his credit.

Dr. Ravindran was the founder Secretary of Indian Society for Spices. He was the Chief Editor of JOSAC for 8 years and President of ISS during 1998 -2000. He and his colleagues instituted the 'Sugandha Bharati Award' for honouring individuals for their lifetime contribution to spices research and development in the country. Presently Dr. Ravindran is consultant to the Kottakkal Arya Vaidyasala, Kottakkal.

Dr. Y R Sarma

Dr. Y. R. Sarma, the President of Indian Society for Spices, joined the Central Plantation Crops Research Institute, Kasaragod during 1972 and later moved to Calicut when the CPCRI Regional Station was started during 1975. Dr. Sarma was the Coordinator of 'National Network on *Phytophthora* Diseases of Horticultural Crops (PHYTONET)' with nine centers through out India. He served as Expert Panel Member on Biocontrol and Biofertilizers of Department of Biotechnology, Government of India, New Delhi and as Executive Member, *Phytophthora* Committee of International Society for Plant Pathology . He was consultant to Indo - Swiss Project, Sikkim, on ginger diseases and to Andhra Pradesh Forest Development Corporation on black pepper diseases. He guided seven students from University of Calicut for their PhD programme.

Dr. Sarma is well known for his contributions on *Phytophthoras* of plantation crops, their epidemiology, host resistance and disease management especially biological control. He has been awarded **Vasvik Award, Dr. C. S. Venkataram Memorial Award** and **Dr. M. Puttarudraiah Memorial Endowment National Award**. He served as Director of Indian Institute of Spices Research, Calicut from August 2000 to May 2002. He continues to be active professionally and the National Coordinator of Biocontrol Programme of Department of Biotechnology, Government of India, New Delhi. He is organizing VI International Workshop on Plant Growth Promoting Rhizobacteria (PGPR) proposed to be held during 5-10, October 2003 . At present he is the member of Governing Body of Tropical Botanical Garden and Research Institute, Palode and the High Power Committee on Biotechnology and International Technology constituted by Government of Kerala.

The members of the Society wish them a happy and peaceful retired life.

RHIZOME SCALE OF GINGER AND TURMERIC

Scale insects are small soft-bodied insects covered with a hard chitinous covering commonly called as scale. Scale insects feed on plant sap with their piercing and sucking mouthparts and cause serious damage to many crop plants. The appendages of female scale insects are highly atrophied and they do not move but remain permanently fixed to plant parts. Among the various species of scale insects infesting spice crops, the rhizome scale (*Aspidiella hartii*) (Hemiptera : Diaspididae) is a serious pest of ginger and turmeric especially in storage.

Ginger infected with rhizome scale

The rhizome scale is widely distributed infesting rhizomes of ginger and turmeric both in the field (especially during later stages of the crop) and in storage in most of the ginger and turmeric areas in India. The rhizome scale has also been recorded on edible tubers such as *Amorphophallus companulatus*, *Dioscorea alata* and *Xanthosoma sagittifolium*. The pest infestation is generally seen during the later stages of the crop on the rhizomes and basal portions of pseudostems and severely infested plants wither and dry. The pest infestation becomes more serious in the field when the rhizomes are not harvested in time. The pest infestation is more serious in storage and the scales encrust the rhizomes resulting in shriveling, loss in weight and desiccation of rhizomes. The pest infestation adversely affects the formation of sprouts and germination of rhizomes and also its yield. Severely infested rhizomes fail to germinate completely.

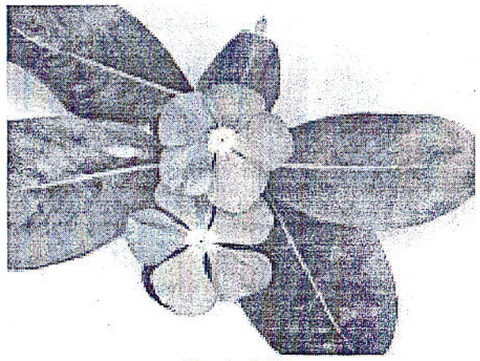
Little information is available on the life history and other aspects of biology of the pest. The adult females are minute, circular and light brown to gray and measure about 1 mm in diameter and appear as encrustation on the rhizomes. Females are ovoviviparous and also reproduce parthenogenetically (reproduction without mating) leading to a tremendous increase in population within a short period.

An integrated strategy has to be adopted for the management of rhizome scale. The rhizomes should be harvested in time from the field. Severely infested rhizomes should not be mixed with healthy rhizomes after harvest and are to be discarded and destroyed before storage. The rhizomes are then to be dipped in quinalphos 0.075% for 20–30 minutes, dried under shade and stored suitably. Sawdust is generally used in the storage chambers for preservation of rhizomes. However, many farmers also use dried leaves of plants such as *Strychnos nux-vomica* instead of sawdust. Use of these materials is effective in preventing the pest infestation; however, the leaves of these plants are to be thoroughly dried before use as storage materials. The storage pits are to be examined at periodic intervals to check for pest infestation on the rhizomes. In case the infestation persists at the time of sowing, the rhizomes are to be once again treated with quinalphos 0.075% for 20–30 minutes.

S. Devasahayam & K.M. Abdulla Koya
IISR, Calicut

MEDICINAL PLANTS AROUND US PERIWINKLE

Periwinkle (*Catharanthus roseus*) is a common bushy medicinal herb of perennial/ annual nature; considered to be very useful in the treatment of cancer and hypertension, found upto an altitude of 900 m in the country. It has got sweet romantic names in vernacular on one hand such as 'Ushamalari' or 'Nityakalyani' (Malayalam, Sanskrit and Tamil) and 'Nayantara' (Bengali), and on the other hand it is also known by such death smelling names as 'Savam nari' in Malayalam due to its wide spread occurrence in the burial grounds. The plant is now cultivated for its roots and leaves in certain parts of Tamil Nadu, Karnataka, Gujarat and Madhya Pradesh in about 3000 ha. Apart from its medicinal properties the plant is also credited with ornamental value. Periwinkle (Family Apocynaceae), was formerly known as *Vinca rosea*.



Periwinkle

The plant grows wild to a height of 1 m and is of evergreen nature. Leaves are dark green, glossy and oval. Flowers are starry with pink – rose, white, or white with rose – pink spots in the center, depending on the type of periwinkle.

Periwinkle contains more than 70 medicinally important alkaloids. In the traditional medicinal systems of Australia, China, Brazil etc., periwinkle is widely utilized for treating diabetes, hypertension, cancer etc. Eventhough the whole plant is important, it is the root bark that is the rich source of alkaloids.

The most important alkaloids obtained from the plant are vincristine (oncovin), vinblastine, vindesine, alstonine and vinorelbine. Vincristine is one of the oldest chemotherapy drugs effective against lymphomas, breast cancer, acute lymphocytic leukaemia, multiple myeloma, neuroblastoma etc.

Periwinkle is also used in the treatment of nervous ailments chronic diarrhoea, excess milk flow, sores, ulcers etc. Two tablespoons standard brew of the plant with honey daily morning and night can be taken internally.

Cultivated crop will be ready for harvest after 1 year. The plant yields 1000 kg roots and 1500 kg leaves per ha.

B. Sasikumar
IISR, Calicut.

CAPSICUM - BLESSING AND CURSE

Chillies (Genus ***Capsicum***), the only crop which contains capsaicin, is a native of South America, but has achieved worldwide distribution and popularity since the Spanish introduced them to Europe over 500 years ago.

The pungency or burning sensation of chillies is imparted by a group of compounds viz., capsaicinoids present in them. When capsaicin-laced oil hits the tongue, calcium begins to flow into pain-sensing nerve cells, but whether capsaicin transmits its burning message by disrupting the cell membrane directly or by interacting with a specific receptor is not known. Recently, a team of cellular pharmacologists from University of California has identified a protein in nerve cells that sets the alarm bells ringing.

The pungency of chillies is measured in 'Scoville' heat units and was developed by Wilbur Scoville, in 1912. Scoville blended pure ground chillies with sugar-water solution and a panel of testers then sipped the concoctions, in increasingly diluted concentrations, until they reached a point at which the liquid no longer burned the mouth. A number was then assigned to each sample based on how much it was needed to be diluted before one could taste no heat. The pungency of chilli peppers is measured in multiples of 100 units, from the bell pepper at 0 Scoville units to the Habanero at 3,00,000 Scoville units! One part of the chilli "heat" per 10,00,000 drops of water rates as only 1.5 Scoville units. Pure capsaicin rates over 1,50,00,000 Scoville units!

Capsaicin has been found to possess several beneficial effects. It is a general digestive aid increasing secretions of salivary glands and stimulating stomach secretions. Capsaicin lowers triglyceride levels, triggers the release of endorphins and unclogs stuffy noses by irritating the mucus membrane. The antibacterial property of capsaicin is beneficial to people ailing from conditions such as stomach ulcers, rather than injuring them further. It is proved that capsaicin prevents certain carcinogens from binding to DNA, and thus offering as a potential anti-cancer drug.

Currently, the best-known medical use of capsaicin is as a topical painkiller. The very quality that causes the burning sensation also causes nerve endings to release mediators, the chemical substances that inform the brain about pain or inflammation. When applied directly to an area that is causing pain, capsaicin empties the stores of inflammatory mediators from the nerve endings, so that they can no longer transmit pain signals to the brain. Pepper creams with capsaicin have been developed and are being used as painkillers for conditions such as herpes (shingles), arthritis and neuralgia.

Capsaicin lives up to its reputation "to bite" in a quantity as small as 0.075% in a cream to help the pain of arthritis. Usually a liquid extract of powdered capsicum, with many different chemicals such as benzyl and cetyl alcohol in a base of white, used at the point of pain, stimulates the circulatory system, relieving pain by promoting good blood circulation. If taken internally it revitalizes cells, veins and the heart. It is said to increase the resistance of blood vessels to harmful compounds and strengthen the vessels.

Capsaicin is known to lower heart attack, lower blood sugar level in persons suffering from diabetes, and normalize blood pressure. The hot stimulating properties of these peppers make them useful as eliminator of headaches. It has been found to help in reducing the recovery time for colds and flu if taken during onset.

Capsaicin, on the other hand has some deleterious effects. It adversely affects the functions of peripheral nervous system and brain. The blood vessels and heart are particularly sensitive to the toxic factors in capsaicin. Capsaicin is also used for defense in pepper sprays; but these sprays are not safe and can cause respiratory problems. Capsaicin is reported to cause duodenal cancer and its tumorigenic and mutagenic effects have also been reported.

T. John Zachariah
IISR, calicut

VIRAL DISEASES CAN BE A FUTURE THREAT TO BLACK PEPPER

Phytophthora foot and root rot and slow decline continue to be the major production constraints in black pepper. However, reasonable management practices have been evolved which are working effectively. Anthracnose caused by fungi, stunted disease caused by viruses and phyllody caused by phytoplasma are gradually becoming serious. The latter two diseases being systemic and obligate in nature are less amenable for control. The causal agents and management strategies for stunted disease are discussed.

Stunted disease of black pepper was first noticed in a black pepper nursery at Neriamangalam, Idukki, Kerala during 1975. At present the disease is noticed in all black pepper growing areas especially in Kerala and Karnataka. The disease is characterized by crinkling, mottling and reduction in size of leaves, shortening of internodes leading to stunting and general chlorosis. The infected vines show gradual decline in vigour and productivity. A strain of cucumber mosaic virus (CMV) has been identified as one of the causal agents of stunted disease. However, the disease might be due to more than one virus. Recent studies at IISR, Calicut clearly established the involvement of a strain of badna virus in the disease complex in addition to CMV. The insect vectors involved in the transmission of both the viruses have to be identified and their ecological aspects need to be studied.

CMV is known to be transmitted by aphids. Although colonization of aphids on black pepper is seen in few vines, its role in the transmission of the CMV is yet to be established. Preliminary studies have indicated that mealybugs transmitted the disease from infected to healthy black pepper vines. Incidentally, mealybugs are known vectors of badna virus. The symptoms due to infection caused by these viruses alone and in combination and their effect on yield need to be studied in detail. In many of the areas in Kerala, banana is affected both by CMV and badna virus. It is important to study as to whether infected banana could serve as a source of infection to black pepper or vice versa. Besides, weeds that also serve as sources of infection need to be identified. The role of the disease in yield reduction needs an in-depth study since some of the infected vines show normal bearing. But the vines showing severe chlorosis and stunting symptoms decline gradually and become sterile. Even though vine death is rare, the production losses due to yield reduction are heavy. Management practices are to be evolved taking into consideration the ecology and epidemiology of the virus disease complex.

Management : Even though insect vectors are suspected to be involved in disease spread, they are to be identified and their role needs to be studied critically to assess the nature and rate of spread in order to take steps to check insect vectors. The disease spread is rapid through planting material since black pepper is vegetatively propagated. When infected plants are used as source of planting material, the cuttings raised and supplied will also be infected and thus disease spreads.

Production of disease free nursery planting material: Selecting healthy vines of released varieties or any other productive type as mother vines is important. However, confirming the disease free nature of the materials through sero-diagnostics is essential. Standardization of sero-diagnostic technologies is in progress at IISR, Calicut. Until such time, selecting planting materials which are apparently healthy is the only practical approach to avoid perpetuation and spread of virus through multiplication of infected planting material.

Eradication of infected plants: A better appraisal to the farmers on symptoms, phased eradication of severely infected vines and replanting with healthy rooted cuttings should be resorted to. This needs to be carried out on a community approach since there is no other method at present to check virus disease. **If these practical approaches of disease management are not taken up on war footing, the virus disease complex can be a future threat to black pepper and would be major production constraint in future.**

Y. R. Sarma, A. I. Bhat, S. Devasahayam & M. Anandaraj
IISR, Calicut

WRONG PLANT DISEASE DIAGNOSIS RESULTS IN HEAVY CROP LOSS - VANILLA BEAN (POD) ROT – A CASE STUDY

Recently at Manalaroo Estate, a concern of AVT at Nelliampathy incurred a heavy crop loss due to bean (pod) rot in Vanilla. Due to continued spray with carbendazim assuming that disease is caused by *Fusarium*, disease increased in severity and there was no any control. On careful examination of infected pods followed by selective isolation of *Phytophthora* from infected tissues and subsequent reproduction of symptoms by artificial inoculation with the fungus, it was correctly diagnosed that disease is caused by *Phytophthora meadii* and not by *Fusarium*. Disease was successfully controlled by phytosanitation followed by spray with Bordeaux mixture/ copper oxychloride alternating with *Phytophos* (Potassium phosphonate).

On pods the disease starts mainly from the pedicel (stalk) as dark patch and rotting extends to pod as a dark brown patch. Shriveling of bean is noticed from the stalk portion and there is no pod shedding immediately but it is gradual. Dried bunches hang on for some time. In the present case carbendazim sprays on *Phytophthora* infection will be ineffective and might even aggravate. Recent observations in Vanilla plantation at Koothattukulam area of Idukki district also showed typical wet rot symptoms. On leaves large water soaked lesions with advancing margins are noticed. In addition to water soaked lesions, fast advancing dark brown patches on stems leading to rotting of affected tissues are also noticed. The isolates from these infected tissues yielded *Phytophthora*.

So it is essential to correctly diagnose the disease before resorting to control measures specially with suitable fungicides. Infection occurs on any portion of the bean. It is typically a wet rot with fast advancing water soaked margins. Under continuous moist condition whitish fungal growth is noticed with abundant sporangia. High elevation >3000 ft, continuous showers with prolonged wet weather, constant wind and low light intensity and temperature between 20-25°C during June-July are ideal climatic conditions for *Phytophthora* infection. Rain splashes due to mild winds would have aided in rapid spread of the disease.

Occasionally stem and leaf rot occurs. *Fusarium* generally infects stems and leaves exhibiting typical dark to reddish brown patch. The dark reddish brown lesions enlarge vertically and appear dry exhibiting dry rot symptoms. These necrotic patches become depressed and affected stem shows wrinkles exhibiting dry rot symptoms. Carbendazim spray is effective in controlling the dry rot. Irrespective of wet rot or dry rot removal of infected portion and burning them off, as a phytosanitary measure is very important to check the inoculum build up followed by prophylactic spray with Bordeaux mixture. Carbendazim (Bavistin) needs to be sprayed only when there is dry rot.

Y. R. Sarma, M. Anandaraj, R. Suseela Bhai, S. S. Veena & P. P. Rajan,
IISR, Calicut

CHANGING SCENARIO OF SPICES PRODUCTION AND EXPORT IN INDIA

India has been a traditional producer, consumer and exporter of spices. With variety of spices in its production list about one third of the world demand is being met by Indian exports. Almost all States in the country produce one or other spices. The total value of spices produced in country is about Rs.30,735.64 crores during the crop year 1997-98. Share of export in total production varies from mere 1.7% in garlic to 73.4% in black pepper and exports accounts for about 8% of total spices production in the country. With unit value of Rs.61546/ton, which is 3.6 times more than that for other horticultural exports, spices play an important role in the agricultural economy of the country. India's exports have grown from US $133 million in 1990-91 to an estimated $430.2 million in 1999-2000. The present status of spices production and export in the light of changed global scenario is presented here.

Table 1 - Area, production and percentage change of spices in India.

Spice	1998-99		1999-00		% Change	
	Area	Prodn.	Area	Prodn.	Area	Prodn.
Black Pepper	239.8	75.7	192.3	58.3	-24.7	-29.8
Chillies	891.2	1043.2	915.2	1018.0	2.6	-2.5
Ginger	77.6	263.2	77.6	263.2	0.0	0.0
Turmeric	160.7	597.9	161.3	653.6	0.4	8.5
Garlic	123.2	570.7	118.8	495.3	-3.7	-15.2
Small Cardamom	66.6	7.0	62.7	7.8	-6.2	10.3
Large Cardamom	18.4	2.0	18.4	2.6	0.0	23.1
Nutmeg	6.5	2.1	7.2	2.2	9.8	8.0
Cinnamon	0.05	0.01	0.05	0.01	0.0	0.0
Cloves	3.2	2.8	2.4	1.7	-33.4	-62.8

Spice	1997-98		1998-99		% Change	
	Area	Prodn.	Area	Prodn.	Area	Prodn.
Coriander	656.5	337.7	546.5	290.0	-20.1	-16.5
Cumin	288.8	115.3	264.0	107.9	-9.4	-6.9
Fennel	28.3	36.9	18.3	23.9	-54.3	-54.4
Fenugreek	33.6	31.4	35.7	35.7	6.0	12.1

Area ('000 ha) Prodn. ('000 tons)

There was a decline in the production of spices like black pepper, chillies and garlic during 1999-00 compared to 1998-99 and the reduction in area (24.7%) and production (29.8%) was prominent in black pepper. In the case of small cardamom though there was a decline in area (-6.2%), the production increased by 10.3%. This is mainly because of increase in productivity due to improved production technologies. Although the area under chillies increased by 2.6 percent during the period, there was a decline in production of 2.5 per cent. In the case of seed spices viz., coriander, cumin, and fennel both the area and production declined during 1997-98 and 1998-99.

Table 2 - Item wise export of spices from India

Item	2000-01		2001-02(E)		% Change	
	Qty	Value	Qty	Value	Qty	Value
Pepper	19,250	32632.75	24,000	21192.5	19.8	-54.0
Cardamom (S)	1,100	5654.7	900	5586.25	-22.2	-1.2
Cardamom (L)	1,645	2768.75	1,250	2038	-31.6	-35.9
Chilli	61,000	19523.5	75,000	25584	18.7	23.7
Ginger	6,580	2295.4	8,000	2503.5	17.8	8.3
Turmeric	34,500	9106	35,000	8462.5	1.4	-7.6
Coriander	11,700	2742.5	15,000	4504.5	22.0	39.1
Cumin	13,800	11743.5	14,000	12334.5	1.4	4.8
Celery	5,250	1700.5	4,500	1357	-16.7	-25.3
Fennel	4,000	1778	4,000	1628	0.0	-9.2
Fenugreek	9,050	1787.5	6,000	1510	-50.8	-18.4
Other Seeds[1]	2,425	896.25	5,000	1767	51.5	49.3
Garlic	11,000	1040.3	1,100	387.0	-90.0	-62.8
Other Spices[2]	35,000	14490	37,000	18220	5.4	20.5
Curry Powder	6,200	3997	6,250	4048	0.8	1.3
Mint Oil	3,875	12645	3,600	12764.2	-7.6	0.9
Spice Oils & Oleoresins	3,625	36405	4,400	38648	17.6	5.8
Total	**230,000**	**161206.65**	**245,000**	**162535**	**6.1**	**0.8**

Qty (Metric tons) *Value (Rs. Lakhs)*

E Rough Estimate.

1 Includes aniseed, bishop's weed (ajowan seed), dill seed, poppy seed, mustard, etc.

2 Includes tamarind, asafoetida, cinnamon, cassia, kokam, saffron, etc.

Source: DGCI & S., Calcutta,

There has been increase in spices exports in terms of both quantity and value during 2001-02. India has exported around 2,45,000 metric tons of spices and spice products valued Rs. 1,62,535 lakhs (0.8 per cent increase over the last year). during 2001-02, i.e. 6.1 per cent more than in 2000-01.

M.S. Madan & J. Nagendra
IISR, Calicut

CURCUMIN- THE WONDER PIGMENT

Turmeric (*Curcuma longa* L.) is a perennial tropical plant indigenous to Southern Asia. The thick underground stem (rhizome) is the major produce of the plant. The yellow colour of the rhizome is attributed to a mixture of pigments called curcuminoids, the major one being 'curcumin'. Due to the presence of the coloring agents, turmeric in middle ages was known as 'Indian saffron' in Europe.

The many sided medicinal properties of turmeric are well known as enlisted below:

- Anticancerous
- Antirheumatic
- Antioxidant
- Hypocholesterolemic
- Choleritic
- Antihepatotoxic
- Antidiabetic
- Spasmolytic
- Hypotensive
- Laxative

All these properties are assigned to the yellow pigment curcumin. The volatile oil constituents are also responsible for many of the medicinal properties.

Curcuminoids is a mixture of three components - curcumin-I (curcumin), curcumin-II (demethoxy curcumin) and curcumin-III (bis-demethoxy curcumin). The relative distribution of these three compounds is a decisive factor in exhibiting the various medicinal properties.

The most striking medicinal property of curcuminoids is its anticancerous property. Among the three curcuminoids, curcumin III is found to be the most potent anticaricinogenic.,Clinical trials have conclusively proved this fact. Curcuminoids are also effective against skin cancer, cancer of fore stomach and colon and also breast cancer. Due to this property, curcumin has recently been designated in clinical literature as a drug/drug model.

Curcuminoids also possess strong antirheumatic property and is clinically proved in rats. It blocks the synthesis of a specific protein formed during arthritic conditions. The blood sugar lowering effect and also the cholesterol lowering property of the pigment is also clinically proved.

All the three curcuminoids act as strong antioxidants. Turmeric also possesses hepatotoxic effect. These effects of turmeric are possible through specific action of definite enzyme systems. Curucumin is also considered as a cure for AIDS. Here curcumin inhibits the enzyme HIV-1 integrase, which promotes the disease. There is no wonder that this pigment can act as a multi-faced drug in future.

B. Chempakam
IISR Calicut

METEOROLOGY AND WEATHER FORECAST

Meteorology is the study of the envelope of air surrounding the planet and the phenomena associated with the atmosphere. A component of meteorology is the study of weather, which is the condition of the atmosphere mainly with respect to its day-to-day effects on life and human activities. Meteorology is also related to climatology, which is concerned with long term manifestations of the weather represented by a statistical collective of weather conditions over a specified period of time. Meteorology deals with both the physical and chemical aspects of atmosphere. Agricultural meteorology is the science, which deals with the study of the physical characteristics of the environment in which plants, animals or microorganisms are grown and effectively utilizing these in the interest of agriculture.

Efforts for predicting the weather date back to very ancient times. Drought, dry winds, floods, frost, rainstorms, hurricanes, black dust storms etc., have often destroyed crops causing wide spread misery. The world Meteorological Organization (WMO) and Indian Meteorological Department (IMD) have a division on Agricultural Meteorology and are doing great service to the farmers by forecasting the weather. The National Centre for Medium Range Weather Forecast (NCMRWF) and SAU's also serve farmers on the aspect of weather forecast.

For agricultural operations weather forecast in terms of rainfall and its intensity, maximum and minimum temperature, wind speed and direction and humidity are required. With accurate weather forecast and well-framed agromet advisories, growers will be able to get optimum harvest and reduce input costs. Day to day operations of farmers are weather sensitive which can be handled efficiently if advised in the light of different validity periods of weather forecasts. Depending on the period of validity, weather forecasts are broadly classified into three groups, namely, short range forecast (SRF) valid up to 3 days, medium range forecast (MRF) valid beyond 3 days and up to 10 days and long range forecast (LRF) valid beyond 10 days and up to a month or a season. Generally, agricultural operations require forecast with validity period of 3 to 5 days. The LRF is useful for long term (month or season) planning in agriculture. The monsoon forecast of IMD is LRF.

The IMD has identified 16 parameters, which have direct relation with the quantum of South West monsoon rainfall received. The parameters are:

1. The pattern of winds at 50 Hecta Pascal (h Pa) i.e., around 20 km height over India.
2. Eurasian snow cover in December (pressure in mid latitudes).
3. Arabian sea – sea surface temperature.
4. Temperature in Central India during May.
5. European Pressure Gradient (January).
6. The temperature on the East Coast of India in March (higher temperatures on the East Coast favour a good monsoon.
7. The Northern Hemisphere surface pressure anomaly between January to April (the average surface pressure of the four months is taken and the difference or anomaly with the normal surface pressure during that period is found out).
8. Argentina pressure in April (South Hemisphere) is negatively correlated.
9. The Northern Hemisphere temperature in January and February.
10. Southern Oscillation Index (SOI), defined as the difference of normalized pressure anomaly between Tahiti (South Central Pacific) and Darwin (in Australia) in spring. If the SOI is positive, India will have a good monsoon.
11. El Nino (the abnormal warm water off the Peru coast) created a low-pressure system over equatorial South Pacific. If in the previous year, a good number of low-pressure areas had formed, it will result in good rainfall during the current year.
12. South Indian Ocean sea surface temperature.
13. Indian Ocean equatorial pressure between January and May. (If there is more pressure in the Indian Ocean, then monsoon will be dull and vice versa).
14. An analogy of the El Nino of previous year and the present year (January, February and March months of present year).
15. Himalayan snow cover between January and March
16. Darwin Pressure Tendency.

These 16 parameters are used to forecast the South West monsoon by IMD. Many places in the country received very less monsoon rains during the current year. Kerala, an important black pepper producing state received 33 per cent less rain compared to the previous year. The crop yield, pest and disease outbreak can be predicted based on weather. Agricultural meteorology is an important science, which needs more attention particularly in the context of global climate change.

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