SPICE VISION

NEWSLETTER OF THE INDIAN SOCIETY FOR SPICES

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FROM THE PRESIDENT'S DESK

Down memory lane ..... wishing and thanking.....

Wishing you well and thanking you, yes.....that is what comes to my mind as I start scribbling this note. Wishing you well as this is the last occasion I will be writing in this column as President of ISS and thanking you for all the support and confidence that you have bestowed on me.

I am happy to note that ISS is progressing year by year. When I sowed the idea of the Society ten years ago, I received whole-hearted support from all my colleagues – present and past. As the founder Secretary, I recollect the time and money that I had to spend to make the Society function in the initial years. With the support I received from my colleagues and the then Acting Director of NRCS Dr.A.Ramadasan and later from Dr. K.V. Peter, Director, NRCS, I could manage the Society in those critical, formative years. ***Let me take this opportunity to thank each one of my colleagues and the past Directors for giving me such total support.*** *When the decision to start a research journal was taken, many people were skeptical, some were sarcastic, but with the confidence given to me by some colleagues and Dr. Ramadasan, I took up the responsibility of editing and bringing out the first issue of the Journal of Spices & Aromatic Crops. This journal is now ranked among the best published in India, thanks to the meticulous editorial work rendered by Mr. S. Devasahayam.*

I was also instrumental in instituting the Sugandha Bharathi Award through ISS, using the money that myself and my colleagues received in the form of a team award from ICAR. My team-mates and colleagues in the Division of Crop Improvement and Biotechnology stood with me and that enabled us to contribute the amount needed to institute the ***Sugandha Bharathi Award for life time achievement in spices research/ development.***

Many Society Members gave tremendous support to the society. The first name that comes to my mind is that of Dr. J.S. Pruthi, the past Vice President of the Society, who also instituted the Dr. J.S. Pruthi Award for the best research paper published in the Journal. I feel proud that I could win this Award two years consecutively. The past President and the former Director of IISR Dr. K.V. Peter has done tremendous services to the Society during his tenure as Director of IISR and also as President of ISS. Among my colleagues I particularly thank Dr. K.V. Ramana who was the founder Treasurer and later Secretary and currently Chief Editor of the Journal, for the whole hearted support given to me during the initial years for building up this Society.

Only with great appreciation I am remembering the role played by the first President of the Society Dr. A. Ramadasan, the then Acting Director of NRCS. But for his total support and confidence that he has bestowed on me, I could not have been successful in my endeavour of bringing up the Society.

I would also like to place on record the dedicated help I was getting from all my colleagues during the various National Seminars the Society organised in the past. I have nothing to offer them, but a ***big thank you*** *that comes from the depth of my heart.*

Everything should end at some time. My time has come now to withdraw from the stage of ISS so that others can carry on the legacy. Let me take leave of you, leaving the society in your hands and I am sure that you will take this Society to greater glory.

Thanking you and wishing you well.

Adieu.

(P N RAVINDRAN)

CENTENNIAL CONFERENCE ON SPICES AND AROMATIC PLANTS (CCSAP)

The Indian Institute of Spices Research (IISR), Calicut, Kerala, an Institute under the Indian Council of Agricultural Research and the Indian Society for Spices (ISS), a professional society devoted to the research and development of spices, aromatic and allied crops, i n collaboration with other agencies is organising a centennial conference during September 20-23, 2000 at Hotel Taj Residency, Calicut.

The conference is arranged to deliberate on issues such as

- Production / Productivity enhancement
- Management of biotic and abiotic stresses
- Biotechnology applications
- Post harvest Industrial processing & Quality upgradation
- Economics, marketing, trade and extension
- Information technology and visions for future

Kindly extend your support to make it a grand event.

Registration Fee : Rs.1000 for ISS Life and Institutional Members
w.e.f 1-8-2000 Rs.1500 for Non members

Co-sponsorship : Rs. 10,000/-

AWARD GLORY CONTINUES

Indian Institute of Spices Research, Calicut bagged the ***Best Institute Award*** for the period 1994-1999 among the ICAR Institutes for the outstanding contribution to spices research and development.

The prestigious **Vividhlaxi Audyogik Samshodhan Vikas Kendra (VASVIK) Award** for the year 1997 was conferred on **Dr Y R Sarma,** Principal Scientist & Head, Division of Crop Protection for his epoch making contribution to the Agricultural Sciences and Technology

Dr Y R Sarma was awarded **Dr M Puttarudraiah Memorial Endowment National Award** for his outstanding contribution to Plant Protection in India.

MEDICINAL PLANTS AROUND US

Wrightia tinctoria (Roxb) R.Br (Apocynaceae)
Known as "Dantappala', 'Ayyappala' or Tinnampala in Malayalam, *Wrightia tinctoria,* a small tree of about 10 m height, is a panacea for psoriasis.

Dantappala occurs through out India. Branches are opposite and divaricate. Leaves are simple, opposite, elliptic ovate, acuminate, glabrous and leathery. Flowers are white, fragrant and appear in lax terminal cymes. Fruits appear in pairs, pendulous, cylindrical and long. Seeds are linear, pointed at the apex with a deciduous coma.

Though the bark and seeds are of digestive and stomachic properties, leaves are used against psoriasis. A handful of fresh leaves are steeped in pure coconut oil and kept under sun for 2-3 days. This, impregnated with coconut oil, if applied regularly for about 1 month, completely cures psoriasis.

The leaves contain the triterpenoids a-amyrin, b-amyrin, oleanolic acid and ursolic acid. The seeds and pods are rich in sterols and triterpenoids. Some rare plant sterols namely desmosterol, clerosterol, 24-methylene 25-methyl cholesterol, 24-dihydro – pollinastanol and 14 a-methyl– zymosterol are present in seeds. The seeds and pods also contain the triterpenoids - wrightial, cycloartenone and cycloeucalynol.

Rooted cuttings of the plant are available from the nurseries of forest department.

B Sasikumar
IISR, Calicut

HOLLOW BERRIES CAUSE WORRIES

Among the various insect pests infesting black pepper in India, the *pollu* beetle (*Longitarsus nigripennis*) is the most important one causing severe crop losses. Surveys conducted earlier in Kerala indicated that the pest infestation is more serious in plains and midlands below 300 m MSL and negligible at higher altitudes above 900 m MSL. However, stray infestations of the pest have been observed at higher altitudes in Wynad and Idukki districts in Kerala in recent years. There are also reports that the pest infestation is increasingly becoming serious in Kodagu district in Karnataka. The changing environmental factors at higher altitudes are

probably one of the main reasons for the increasing occurrence of *pollu* beetle in this region in recent years.

The adults are small beetles measuring about 2.5 mm x 1.5 mm in size, the head and thorax being yellow-brown and the elytra (the fore wings covering the abdomen) black. The femur of the hind pair of legs is considerably enlarged and the beetles jump away quickly when disturbed and hence are also called as flea beetles. The adults scrape and feed on tender leaves, spikes and shoots that are formed with the onset of pre-monsoon showers during May-June. The presence of numerous small holes on the tender leaves is a characteristic symptom of the occurrence of the pest population in the plantation.

The females lay eggs on tender berries that hatch in 3-8 days into minute (about 1.5 mm long) creamy-white grubs. The grubs bore into the tender berries and feed on the internal contents and make them hollow. The infested berries turn pale yellow initially and later black, and crumble when pressed. The grub period lasts for 20-40 days and a single grub destroys 2-3 berries during this period. In severely affected plantations the pest may damage 30-40% of the berries. Fully-grown grubs drop down to the soil and pupate in earthen cocoons and emerge as adults after 6-8 days. The adults stop laying eggs when the berries mature during November-December and are present in reduced numbers in the plantation during January-May after the berries are harvested and survive by nibbling and feeding on older leaves. With the onset of monsoon showers in May-June and the formation of tender leaves and spikes, they resume their normal feeding and breeding activities. The pest infestation is higher in the field during September-October and is very severe in shaded areas in the plantation. Vines that are trailed on standards like jack and mango trees that produce heavy shade are severely infested by *pollu* beetle.

Attempts to develop integrated management schedules against *pollu* beetle are in progress at the Indian Institute of Spices Research, Calicut, for the past two decades. No important natural enemy of the pest has been recorded so far. Cultural operations like regulation of shade of standards by pruning off branches are important to reduce the population of *pollu* beetle in the field and to achieve the desired level of control while utilizing insecticides. Various insecticides have been evaluated in the field and among them endosulfan 0.05% or quinalphos 0.05% were the most effective when sprayed during July (or 1 month after berry set) and October. Neem-based insecticides were also found effective against *pollu* beetle and these can either be used alone or alternatively with insecticides. Thus, endosulfan 0.05% may be sprayed during July followed by 3-4 sprays of neem based insecticide such as Neemgold 0.6% during August-October. By adopting these spraying schedules the residue levels in black pepper berries at harvest were well below the permissible level fixed by the importing countries. Since the spraying operations coincide with the monsoon season, the insecticides are to be sprayed when there is sufficient gap in the rains. The undersides of leaves are also to be sprayed thoroughly since the adults are generally seen feeding and resting in this region. Adoption of timely crop protection operations against *pollu* beetle would result in higher yield and increase the productivity of the crop.

S Devasahayam and K M Abdulla Koya
IISR, Calicut

FAIR IS DEAR

Stripping pepper gives white pepper, the fair darling among spices. India is famous for 'black gold' or black pepper. It has been named black gold for its unique property compared to other spices that black pepper if stored properly can be kept for years together without deterioration in quality. In European countries such as Germany, Sweeden and Denmark, white pepper is preferred over black pepper. Indonesia converts most of its pepper into white pepper. There was a time when more than 70% of white pepper trade in the world market was owned by Indonesia.

White pepper is generally prepared from fully ripe bold berries by retting method. In order to achieve uniform ripening after harvest the berries are sprayed with 1000 ppm ethrel. The ripe bold berries are packed in gunny bags or soaked in water tanks with change of water every 24 hours. If it is kept in water tank, water has to be changed every 24 hrs. After 7-8 days, the degraded outer skin can be removed by trampling with leg or by rubbing on a wire mesh. The deskinned berries are washed thoroughly, sundried and packed as white pepper. Green pepper when converted to black pepper the recovery is about 33%. Ripe berries when converted

to white pepper the recovery is 24-28%. Bold berries of about 3.75 mm diameter or more are preferred for white pepper preparation. Among the popular pepper cultivars Panniyur 1, Valiakaniakkadan and Balankotta are preferred for this product. The allowed moisture level of white pepper is 8-10%. At this moisture level, white pepper can be stored in polythene coated gunny bags for a long time. The retting method is the most preferred one as it gives a little fermented note to the produce. Regional Research Laboratory at Thiruvananthapuram has developed a method with shorter retting period for white pepper production. The major constraint of retting method is that it is highly season oriented and only ripened berries are suitable for making the product.

White pepper fetches a premium price over black pepper. Except for a slight volatile oil loss (about 0.5%) the product is qualitatively same as black pepper. White pepper is also used for making powder and oleoresin. Efforts are being made to develop newer methods for converting black pepper to white pepper, so that the produce can be made available throughout the year. College of Agricultural Engineering, Tavanur (Kerala), Department of Agricultural Engineering (TNAU) are engaged in developing decorticating machines which can convert black pepper to white pepper with minimum damage. About 20% berries are lost as powder if the decorticating machines are used, which is a great loss to the farmers/entrepreneurs. If this problem is overcome, it will be a boon to white pepper industry.

T John Zachariah
IISR, Calicut

RELAX FROM WILT

Bacterial wilt of ginger, or "Mahali" is a serious disease of ginger in India. The bacterium is both soil and seed (rhizome) borne. The disease is becoming serious in countries like Indonesia, China and Malaysia mainly due to unregulated movement and use of infected seed rhizomes and also rhizomes with hidden infection with *Ralstonia solanacearum*. The bacterium infects more than 450 plant species both in monocots and dicots. This bacterium infects other agriculturally important crops like potato, ginger, tomato and banana without producing any symptoms.

What are the symptoms of ginger bacterial wilt?

The disease manifests in the form of typical wilting of plants as if it is suffering from water stress despite abundant moisture in soil. Drooping of leaves starts from lower part of the plant and it progresses upward. Yellowing of leaves generally starts from bottom leaf and in advanced cases, the plant turns into golden yellow colour, rhizome rots and pseudostem ultimately dries off.

How to differentiate bacterial wilt and rhizome rot?

Correct diagnosis is important for suggesting disease management strategies. As ginger is susceptible to other soil borne pathogens it is important to know the key symptoms of other diseases. In a ginger field bacterial wilt and rhizome rot may be seen together. The appearance of ooze from cut end of leaf/pseudostem/root is one of the confirmatory tests for bacterial wilt. Foul smell associated with rhizome rot is normally lacking in bacterial wilt. If foul smell is associated with wilted plant it is a typical case of combined infection of bacterial wilt and rhizome rot. The key differences between bacterial wilt and rhizome rot are given below.

Bacterial wilt	Rhizome rot
1. Down curling of leaves	Leaf blade is generally open
2. No yellowing in the early stages of wilting	Yellowing is the key symptom of rhizome rot
3. Plants cannot be pulled out from soil during initial state of disease	Plants can be pulled out of soil easily
4.No foul smell is associated with bacterial wilt	Typical foul smell is associated with rhizome rot
5. Ooze can be seen when cut end is put in water	No ooze can be seen

How to detect *Ralstonia* in soil and seed rhizome?

Bacterial wilt can be managed if the planting material is certified free of pathogen. Various techniques are available to detect the pathogen in seed rhizomes. Semi-selective medium recommended by European Plant Protection Organization is useful to detect *Ralstonia* in soil and plant samples. The detection limit of this technique is 100 cell per ml of ginger extract or soil suspension. However, the detection based on selective media is time consuming, laborious, expensive and requires frequent standardization particularly when soil samples from different locations are tested. Many latest techniques are available to precisely detect bacterium in soil or ginger rhizome, among them advanced techniques like Enzyme Linked Immunosorbent Assay (ELISA) is very sensitive, quick, easy and cheap. ELISA is particularly suitable for large scale detection of *Ralstonia solanacearum* in ginger samples.

How to produce bacterial wilt free ginger?

As ginger is cultivated in virgin soil or previously fallowed soil the disease can be managed if adequate care is taken in right time. In the absence of chemicals and other tolerant varieties, the most effective way to check bacterial wilt is by using disease free planting material. Care should be taken to select rhizomes for planting. Normally the ginger cultivated in disease free environment is used for seed purpose.

What to do, if the disease is noticed in the field?

The infected plant should be carefully removed without spilling soil particles on the ground. The infected plant along with one or two healthy plants and soil scooped from the ground should be disinfected or burnt out or buried deep in the soil away from the ginger field. This practice should be done when the infected plant is still green but drooped and wilted. Application of copper based fungicides in the bed can be done to arrest further spread of the pathogen.

A Kumar and Y R Sarma

IISR, Calicut

THE DIVINE BARK

The dried inner bark of an evergreen tree, *Cinnamomum verum* (Bercht. and Presl.) is the cinnamon of commerce. It is considered to be a native of Sri Lanka. The bark, oil and oleoresin are the economically important products. Bark is extensively used as spice or condiment. It is used for domestic culinary flavouring and for manufacture of sauce, candy, pickles and some beverages. It possesses carminative, astringent, stimulative and antiseptic properties.

Cinnamon was introduced into India during the eighteenth century by European settlers from Sri Lanka. It is an evergreen tree, reaching a height of 6-15 meters. The cultivation of cinnamon is prevalent in hilly regions of Western Ghats. The Indian Institute of Spices Research, Calicut has a total of 290 accessions of cinnamon. The crop improvement programme in cinnamon emphasizes on selection of high yielding and high quality lines. Two varieties namely, IISR Navashree and IISR Nithyashree which excel others in regeneration capacity, yield and quality, have been released by the Central Variety Release Committee as national varieties for cultivation in suitable localities throughout the country. Navashree yielded 55.6 kg dry quills/ha/year in the initial few years, with 2.7% bark oil, 8% bark oleoresin, 73% cinnamaldehyde in bark, 2.8% leaf oil and 62% leaf eugenol content and Nithyashree yielded 54.2 kg dry quills/ha/year, with 2.7% bark oil and 78% eugenol content. Young flushes of Navashree are purple in colour which turn into green in 7-10 days, while in Nithyashree this occurs in just two days.

These are mostly grown under rainfed condition and can come up well from sea level upto an elevation of about 1000 m. Spacing recommended is 3x3m (1111 plants/ha). Fifty cubic metre pits are ideal for planting.

Regular weeding during early stages of growth is essential. Irrigate first three years during summer months. Prune 3 year old plants at 15 cm height above ground level. Cut side shoots growing from base to encourage growth of more side shoots till the whole plant assumes the shape of a low bush.

Fertilizer application:- Apply 20 g N:18 g P_2O_5 : 25 g K_2O/plant one year after planting. Increase the dose to 200 g N:180 g P_2O_5 and 200 g K_2O for grown up trees upto 10 years and above (in 2 equal split doses in May-June and September-October). Spray 0.05% quinalphos during the flushing season to control leg eating caterpillars.

Harvesting and processing: Plants will be ready for harvesting 3 years after planting and can be harvested every alternate years. Bark must be dried in shade for 1 day and in sunlight for 4 days. When the drying is complete, the bark can be packed in bundles for trade purpose.

B Krishnamoorthy, J Rema and P A Mathew
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DOWN DOWN INORGANICS, UP UP ORGANICS ?

This is the era of organic farming. Lots of advantages are highlighted on the use of organic manures and ecofriendly approaches in farming to safeguard soil as well as human health. Organically cultivated crops fetch a premium price in Western markets. Efforts are made to create awareness among farmers regarding the advantages of organic farming, at the same time, over emphasizing the ill effects of inorganic fertilizers on soil health and insecticides and fungicides on human health. But for a country like India, especially with the present status, with ever growing population and high demand for food grains whether switching over to complete organic farming will alleviate the hunger of these millions of people?

The green revolution has solved our food problem to a major extent. Since the last 3 decades, we have progressed sufficiently in our food production. How could we achieve this? High yielding varieties, irrigation facility, use of inorganic fertilizers and insecticides –all led to increased production.

Our population has crossed 100 crores (1000 million) now. Every year, we are adding another 21 million people to the universe. So, in the next 20 years, we may add another 420 million people to the universe and we will face food shortage. This will lead to a situation wherein we may have to import 45 million tonnes of food grains. Our population growth rate is 1.9%. Depending on this, the demand for food grains is also increasing. To meet this, we have to increase our food grain production by 5 million tonnes every year. By 2020, we may require 294 million tonnes of food grains (122 million tonnes rice, 103 million tonnes wheat, 41 tonnes of other cereals and 28 million tonnes pulses). Our cultivable area has not increased. So, the only way to meet the ever increasing demand for food grains is to increase the productivity. How?

Under these circumstances, is it wise to go for complete organic farming or whether organic farming can meet this demand? There is no doubt about the usefulness of organic farming. It helps in getting sustainable production. Apart from being ecofriendly and improving soil health, it keeps us healthy by providing healthy food. But two things are very important. On one hand, we have to feed the hungry population and on the other hand, we have to protect our soils and ecosystem, sustain our production levels, at the same time protecting our health.

So it is very difficult to adopt organic farming to meet our requirements. Though organic farming provides all the nutrients required for plant growth, the quantity available is very less. High yielding varieties require more nutrients. So organic farming can be adopted in countries where the food production is more than their requirement.

Inorganic fertilizers play a major role in increasing the productivity. According to a report, 50-60% yield increase has been achieved through the use of inorganic fertilizers. Compared to China/Japan, India is far behind in the use of inorganic fertilizers. We are using on an average 69 kg per hectare as against 366 kg by China and 300-400 kg by Japan. So to meet our food requirements, we may increase our inorganic fertilizer usage to 100 kg per hectare along with sufficient organic sources.

Keeping in view of the ecosystem, health and also the demand for food production, inorganic fertilizers may be used more scientifically (avoid leaching, applying at little deeper depths and covering with soil, applying in splits, use of slow release fertilizers etc.) with the simultaneous use of oil cakes such as neem cake. Similarly though the use of insecticides and pesticides increased the yield, they had their ill effects on the environment. So only in extreme cases these should be used with care. Otherwise, pests and diseases should be controlled by traditional means (use of predators/parasites, plant based pesticides, crop rotation, light trap for insects etc.).

Finally to conclude, to feed our ever growing hungry population increase in food production is very essential. Besides, sustainable production along with protection of the environment is also important. This can be achieved by the judicious use of inorganic fertilizers along with soil health protective organic manures.

K S Krishnamurthy
IISR, Calicut
(Source: Adike pathrike)

BUZZY BEES MAKE QUEEN FERTILE

Pollination is an essential aspect for reproduction of flowering plants. It involves transfer of pollen from anther to stigma of flowers. Seed setting is an important aspect of crop production as in a number of agricultural crops including spices, seeds are the final product of economic importance. The insect pollinated crops have higher percentage of seeds, higher percentage of seed germination and are rich in nutrients.

Among the cross-pollinated flowers, entomophily (Pollination by insect) contributes around 85% of flowers while 10% are anemophilous (Pollination by wind) and the rest are self pollinated. Among insects, melittophily (pollination by honey bee) ensures about 90% pollination. According to an estimate, if all honeybees were eliminated from the universe, the total world agricultural production would drop by one-fourth.

Small cardamom (*Elettaria cardamomum* Maton) popularly known as the "Queen of Spices" is highly cross-pollinated and depends solely upon honey bees for pollination. The stigma receptivity to pollen in small cardamom is at its peak for just three to four hours and this period is most critical for pollination. If pollination does not occur, by late evening the flower withers away and dies off resulting in lesser fruit-set and a significant drop in the yield. Cardamom flower is bisexual, fragrant, nectivorous, lip-like, streaked with united colour which is an irresistible attraction to the bees. As cardamom bushes grow at ground level and pollen grains being sticky, wind pollination is almost non-existent. Moreover, the stigma is protruding above the anther, discouraging self–pollination. Hence, insects become the only source of pollination and honeybees account for 98% of all insect pollination making them extremely vital for the survival of the crop. Very rarely butterflies and ants were also seen calling on cardamom flowers but their role in pollination is negligible. Of the four types of honey bees, *Apis dorsata* (Giant rock bee) and *Apis cereana indica* (Indian honey bee) were found to be the most effective pollinating agents. A survey revealed that, 80% flower visits were done by *A. dorsata* and the rest 20% by *A. c. indica.*

In recent years, deforestation coupled with usage of bee toxic insecticides has led to a decline in bee population and thereby the yield of cardamom reduced drastically. In India, the yield of cross-pollinated crops is not up to the desired level because of many factors. Among them, lack of desired number of pollinating agents during flowering period and unawareness about pollination to the farmers are the most important. Thus the yield of cardamom can be increased significantly by providing sufficient number of pollinating bees. It also helps in early seed setting and uniform stand of the crop. Besides pollination, hive products viz. honey, wax, propolis, royal jelly and bee-venom will be of additional remuneration to the farmer.

Factors encouraging cardamom pollination

- Undisturbed natural forest ecosystem will provide good harboring place for the honey bees.
- Non-destruction of rock bee hives in the cardamom plantations if any.
- Protection of the hives from honey bee enemies such as birds and reptiles.
- Avoid indiscriminate and calendar based application of insecticides during peak flowering period.
- Use insecticides with minimum toxicity to bees *viz.,* Endosulfan, Fluvalinate in the dusk, when bee activity will be less.
- Artificial bee-keeping in cardamom estates by providing artificial hives
- Planting bee lure flowering shade trees that may nourish in the off seasons
- Spraying of bee lure chemicals

It has been estimated that 25-30% of crop loss is attributed to improper pollination and fruit setting. Let us concentrate on this key aspect for a prosperous yield in cardamom.

A Joseph Rajkumar, Sainamole Kurian, S Backiyarani and M Murugan
Cardamom Research Station, Pampadumpara

BUSHY IS CASHY

Black pepper fruiting branches (laterals) when cut and rooted grow like a bush rather than a vine. Hence, it is called as bush pepper. A very simple method has been developed by IISR to produce bush pepper. In this method, one year old healthy laterals from high yielding vines are collected, their leaves removed except the flag and dipped in 0.2%

copper oxychloride solution for 5 minutes. A sharp slanting cut is given at the basal portion and dipped in rooting hormone powder/solution, excess hormone removed and planted in a polybag containing moist, well decomposed coir dust. Four to five laterals can be planted in a polythene bag of 30 x 45 cm size. Mouth of the bag is tied and hung in shade for faster and easy rooting. It takes 45 days for rooting after which these laterals can be replanted in a polythene cover containing potting mixture (forest soil, sand and FYM in 3:1:1 proportion). These can be further put into pots or planted directly in field after keeping them in shade for two months.

Bush pepper is grown in pots for getting green pepper round the year and also for aesthetic purpose. For this, 12 inches diameter earthen/ cement pots are filled with potting mixture and rooted lateral is planted in it. These pots are kept in a shaded area and irrigated regularly. A well maintained bush pepper can yield 500 to 1500 g green pepper which can be harvested round the year. Fertilizers such as groundnut cake (15 g), super phosphate (3 g) and muriate of potash (4 g) are applied at bimonthly intervals. To minimize disease incidence 0.2% copper oxychloride is drenched @ 100 ml/pot and 0.2% akomin spray is given occasionally. In this way each house can maintain 8-10 pots easily and meet its green as well as black pepper requirement.

Bush pepper can also be grown in field under 2x2 m spacing. For this pits are taken (0.5 x 0.5 m), filled with FYM and loosen the soil, then rooted bush pepper is planted. Five kg FYM once in an year and 20 g urea, 25 g superphosphate and 30 g muriate of potash are given once in three months and irrigated regularly. 0.2% copper oxychloride drenching @ 2 l/plant and 0.2% akomin spray are given occasionally.

Hamza Srambikkal and V Srinivasan
IISR, Calicut

HAPPY LIFE WITH WORMS

Earthworms play a key role in soil biology as versatile natural bioreactors. They have been silently ploughing the land for millions of years and assisting in the recycling of organic nutrients for the efficient growth of the plants. They effectively support the beneficial soil microflora and destroy the pathogens in the soil. Vermicompost is a compost prepared by using earthworms. This compost contains major and minor nutrients which can be easily taken up by plants. Besides, it also contains vitamins and plant growth hormones which enhance the growth of the plants as well as microbes.

Vermicomposting is not a complicated technology. It can be adopted even by a layman. To start with a pit of size 2.5 (length) x 1 (height) x 0.3 (breadth) m dimension is to be prepared in a thatched-katcha malleting. A layer of coconut husk is to be spread at the bottom of the pit. Sprinkle water on the husk. Spread over it bio waste – cattle manure mixture in the ratio 8:1 upto a height of 30 cm above ground level. A slight irrigation is to be given daily so that the waste undergoes partial decomposition. Worms of 500-1000 nos. (1/2-1kg) are sufficient for this pit and can be introduced after 2 weeks. All types of wastes ie. farmwaste, kitchen waste, livestock waste, market waste etc. can be used for composting. Cover the pit with coconut fronds and sprinkle water daily or on alternate days. Compost will be ready within 45 days. Then remove the compost from the pit and heap it in an open space with sufficient light for 2-3 hours. Remove compost from the top and dry in an open space, sieve and pack. Undecomposed residues and worms at the bottom of the heap may be kept in the pit for further composting.

Vermicompost augmented the growth of the pepper cuttings and clove seedlings in nursery conditions. Generally two year old seedlings of clove are recommended for field planting. One year old clove seedlings supplied with vermi compost attain hard vigorous growth as that of two year old clove seedlings. Transplanting time of clove seedlings could also be shortened to one year by adopting soil and vermicompost in 1:1 proportion in the nursery.

C K Thankamani
IISR, Calicut

TICKLING PICKLE

Pickling is a method of preservation of food items with the addition of salt, spices and vinegar. I n India, pickling of fish, shellfish and other aquatic products are not as popular as agricultural commo

dities. But in countries like Germany, Canada, Philippines, United Kingdom, China, Japan, Denmark, Norway, Korea, Guyana etc. pickles from aquatic products are popular. Fish pickles are semiperishable in nature with its limited concentration of salt and acid and are highly appealing as compared to salted and dried fish.

Any fish, irrespective of its size, can be used for pickling. Even cheap varieties of fish landed as by catch like pink perch (*Nemipterus japanicus*), lizard fish (*Saurida tumbil*), croaker (*Jhonius* spp.), ribbon fish (*Trichiurus* spp.) etc can be used for pickling.

A simple recipe for pickling fish is given below

Fish meat	-	1 kg
Gingelly oil	-	350 g
Green chillies	-	100 g
Ginger	-	50 g
Garlic	-	200 g
Chilli powder	-	150 g
Turmeric powder	-	50 g
Pepper powder	-	50 g
Mustard seeds	-	50 g
Fenugreek powder	-	25 g
Curry leaves	-	50 g
Vinegar	-	600 ml
Salt	-	150 g (varies with taste)

Mix the fish meat with pepper powder, salt and turmeric powder and keep aside for half an hour. Grind half of green chillies, garlic and ginger, chop the other half finely and keep these separately. Fry the minced fish in oil and keep aside. In the remaining oil fry mustard seeds, curry leaves, chopped spices and powdered spices. Add fried fish and vinegar to this and allow the contents to boil for 5 minutes. Let it cool before bottling. Pickles should be packed in sterilized glass bottles and sealed with acid resistant caps. Care should be taken to see that a layer of oil is seen above the contents. If not, heat some oil and pour it over the contents. This pickle will have a shelf life of 6 months. In order to extend shelf life, some preservatives like sodium benzoate (0.2%) and ascorbic acid (0.3%) can be added.

Pickling preserves the fish for longer period than any other method of fish curing.

Although tartaric, citric and lactic acids are reported to be effective for pickling of fish, they are not much favoured by the fish processors.

Consequent to urbanization people prefer fast food. During lean fishing season there will be great demand for fish pickles. Fish pickling is a means of earning additional income for fisher women and unemployed youth.

Femeena Hassan
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GO HEALTHY WITH HALDI

Turmeric, *Curcuma longa* L. *(Zingiberaceae)* was known in the middle ages as 'Indian saffron', due to the presence of the yellow colouring principle, curcumin. Turmeric colour changes to deep brownish red, by the addition of lime, which forms the basis of making 'kum-kum', regularly used by Indian women as an auspicious mark on their foreheads and used as a customary social offering. This change in colour is also used as a pH test (turmeric paper) in early chemistry. The formation of characteristic red colour that curcumin forms with boric acid is used as a test to identify turmeric.

Curcuminoids, which belong to the family of diaryl heptanoids, are composed of three compounds in the ratio 60:30:10, viz; Curcumin (Curcumin I), Demethoxy curcumin (Curcumin II) and bis-demethoxy curcumin (Curcumin III). The percentage of curcumin in turmeric rhizomes ranges from 3 to 6.

In the indigenous systems of medicine, turmeric has been used since time immemorial. It enjoys the reputation as an anti-inflammatory agent, as a carminative, diuretic and blood purifier as well as a remedy against jaundice. It is also effective against common cold, leprosy, fever, liver infections and also in the treatment of ulcers. It also possesses antirheumatic, anti-bacterial and spasmolytic properties. Due to its anti-infectious and anti-inflammatory properties, curcumin is now being currently used as a cure in AIDS patients. In fact, all the three curcuminoids are found to be the most potent anticarcinogen, inhibiting mutagenesis and carcinogenesis, due to their ability to scavenge oxides and peroxides. It has been identified as the most recent anti-cancer drug in Chinese literature.

Curcumin can also be used as a natural colouring matter for food and textile industry. Thus, turmeric, when fed to broiler chicken gives a golden yellow colour to their skin. Bangladesh has started using

curcumin as a dye for jute and wool. With the growing demand for natural dyes in the West during the last 10 years, and also due to the ban on the use of synthetic dyes in foods and drugs the demand for turmeric and turmeric products is constantly on the rise.

The prominence gained by curcumin during the last two years makes it second only to the famous neem plant!

B Chempakam
IISR, Calicut

DR PRUTHI'S COLUMN

POST-HARVEST TECHNOLOGY OF SPICES – 1

Since ancient times, the farmers and traders have tried various methods of separating impurities from the produce by processes such as air-winnowing. In the present era, every family is so preoccupied with other activities in day to day life that they need cleaned or processed food/ spices. Hence, it is essential to adopt machines for cleaning/grading processes for spices. This has led to the development of various machineries to meet these requirements, some of which are briefly described below.

Principles of separation of contaminants from spices

The freshly harvested spices contain the following types of contaminants which are to be separated from spices as early as possible.

1) **'Fines'**, such as **dust, sand** etc.
2) **'Lights'** such as straw, sticks, stems, leaves, hulls, etc.
3) **'Heavies'** such as stones, mud balls, metal pieces etc.
4) **Immature**/shrivelled/damaged/birds eaten seeds or seed spices
5) **Weed seeds** mixed with seed spices etc.

In order to produce the desired quality of spices, various physical properties of seeds, grains, impurities and other contaminants are used to evolve the design of separating machines. A single machine cannot separate all types of spice seeds that differ in all these characteristics. In most of the cases separate machines are to be used to achieve good quality of spices.

Industrial separation equipments

Various separation equipments used in processing industries and the principle involved in separation are given below.

Name of equipment		Principles employed
Plain cleaner and graders	-	Size, width, thickness
Pre-cleaner and scalpers - Screen-air – separators, Fine cleaners cum graders	-	Size, aerodynamic-terminal velocity
Aspirators/air classifier / Airwash scalpers.	-	Aerodynamic – terminal velocity
Indented cylinders	-	Length, shape.
Spiral separators	-	Shape, frictional coefficient .
Draper belt	-	Surface texture, shape
Table separator/Compartment separator	-	Specific gravity, shape, surface texture, frictional coefficient
Gravity separator/Destoner	-	Specific gravity, frictional coefficient .
Magnet drum/Pulleys	-	Ferromagnetic
Magnetic seed separator	-	Affinity for liquids
Electrostatic	-	Electrical conductivity
Electronic colour sorters	-	Colour reflectivity

Depending upon the business activity or capacity of the processing industry, separation operations can be divided into four groups as under:-

1. Pre-cleaning
2. Fine cleaning/grading
3 Finishing of product
4 Special purpose separation process

Precluding machine :

Airwash scalper aspirator :

This is the simplest pre-cleaning machine in which light grains, light and fine impurities are separated by air-current passing through the falling admixtures in a vertical drum. It is a static thrust to the deck, torque action to the deck and inline motion of the deck. It is an important machine for spice seed processors and grain cleaners who desire to produce the best quality cleaned product. This static machine is having only one fan as a moving component. In this machine, sizing of grains is not possible. However, in some aspirators, grains are roughly separated (on the basis of their density) into different chambers.

Plain cleaner scalper:

These are open type machines without 'air systems'. They separate large and small size impurities on the basis of sieve openings provided. They cannot separate light impurities matching to the product size. These cleaners can be **'flat-deck', "vibrating type"** or **'cylindrical rotary drum'** type.

Screen-air-separators/ Air cleaners:

These types of machines have built in flat rectangular decks-either two decks or three decks-having larger and smaller perforations to control seed size. They are provided with perspiration and/or post-aspiration system to remove light seeds, light & fine impurities. According to the motion of decks, they are classified as: (1) Vibratory (2) Reciprocating (3) Gyratory. This type of precleaners provide more effective precleaning as the equipments are provided with adjustable controls for feed, air, amplitude, vibrations, speed, inclination etc.

(To be continued)

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Directorate of Arecanut and Spices Development, one of the pioneer organizations in the country, is devoted to Research and Development of arecanut and spices with its head quarters at Calicut. It was established in 1966 by Govt. of India with a mandate to extend research results from labs among farmers and to serve as an extension cum development facility for spices. Its major thrust areas are assessment of the developmental needs of these crops, formulation, implementation and monitoring of Centrally sponsored schemes through State Agriculture Departments and Agricultural Universities, collection and compilation of statistics on these crops and serving the central and state governments on commodity developments.

The developmental activities include production of nucleus planting material, conducting demonstration trials and distribution of mini-kits. The Directorate extends its services by offering training to growers and extension workers.

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