



NEWSLETTER

ICAR RESEARCH COMPLEX FOR GOA



Vol. 11 No. 1

JANUARY TO JUNE - 2009

From the Director's Desk....



Prospects and Problems of Floriculture in Goa

All occasions celebrated by human beings are marked with flowers and in fact they have occupied a prominent place in human's life style. India has a long tradition of floriculture. However, the social and economic aspects of flower growing were recognized only later. It is only in the last three decades with changing life styles and under increased urban affluence, floriculture has assumed a definite commercial status.

Major production is traditional flowers (loose flowers like marigold, jasmine, chrysanthemum, aster, crossandra, tuberose *etc.*) and cut flowers (rose, gladiolus, tuberose, carnation, orchids, lilliums, gerbera, chrysanthemum, gypsophila *etc.*). Major flower growing is carried out mainly on small holdings and few export oriented units. Floriculture has become a source of gainful employment in our country. Retail and wholesale flower growers are the major players in our country for domestic market. Retail cut flower business is flourishing day by day in every state. India is the second largest grower of flowers after China. About 1.16 lakh ha of area is under floriculture, producing 6.5 lakh tonnes of loose flowers annually. The production of cut flowers increased over the years and the present production stands at 1,952 million flowers during 2002-07. At present, global floricultural exports stand at Euro 5.1 billion, which is expected to touch Euro 9.0 billion by 2025. The value of cut flower export increased by more than US\$ 300 million between 2003 and 2004 to US \$5,05,039 million. The Netherlands continues to dominate the flower trade with US \$2,900 million export (58 % of total cut flower exports) followed by Colombia and Ecuador. The floricultural exports in India registered a phenomenal growth during the last decade. The floriculture exports, which stood at Rs. 63 crores during 1996-97, almost tripled to Rs.211 crores during 2004-05.

The economy of Goa is based on tourism and mining and these sectors generate the income for livelihood of most of the people. However, agriculture can complement and supplement above activities and also to help in increasing the income and

employment of marginal farmers and rural youth. Annually Goa has recorded a tourist inflow of more than 20 lakhs domestic and over five lakhs foreign tourists which demands for more and more floriculture products. In addition to this, Goa is conveniently located with very good transport linkage with metros like Mumbai, Delhi, Kolkata, Chennai, Bangalore and Hyderabad. As per the 2001 agricultural census, nearly 81 per cent of land holdings are below the size of one hectare and about 11 per cent holdings are between 1-2 hectares. Thus, small and marginal farmers constitute the bulk of the land holders. Floriculture is a viable option for these small and marginal farmers.

Goa, a beautiful small state, with an annual average minimum and maximum temperature ranging between 18°C to 35°C with an average annual rainfall of 3000mm makes it more suitable for cultivation of cut flowers, loose flowers and cut foliage.

Traditional flowers like Marigold, Jasmine and Crossandra are commonly grown on a smaller area mostly for local consumption. Though Goa is lagging behind in production of flower crops, it is leading in consumption of all types of flowers and cut foliage throughout the year and the demand for these crops reaches peak during tourist season starting from October to May coupled with many religions functions. Rose, Golden rod and Marigold are top most flowers in cut flowers, fillers and loose flowers respectively imported in to Goa markets.

Cut flowers comprising of Rose, Aster, Gladiolus, Carnation, Gerbera, Chrysanthemum, Tuberose, Alostromeria, Lillium, Orchids, Anthurium, Bird of Paradise, Heliconia and ginger lily followed by loose flowers *viz.*, Marigold, Chrysanthemum, China aster, Tuberose, Jasmine, Rose and Gaillardia are commonly brought from other places. The cut foliage and greens which are commonly procured are palm leaf, cypress, asparagus, aralias, thuja, ferns, cycus, leaves of Heliconia and Bird of paradise, philodendron, dracaena, cordyline, pleomele *etc.* An estimate indicates that nearly 13 per cent of total flowers auctioned at Bangalore are being sent to Goa and the annual worth of flowers would be around Rs.15 crores.

Three important factors for a successful floriculture venture *viz.*, favourable climatic conditions for growing of wide range of flower and foliage plants, sustained domestic as well as export demand for flower crops with good transport facility and ready support from the Government and policy makers to make the floriculture profitable venture are very much available in the state of Goa. In addition to this, of late, Goa is being the venue for many national and international conferences, seminars, meetings including International Film Festival of India which actually requires huge quantity of flowers for hotels, meetings *etc.*

Studies conducted at the ICAR Research Complex for Goa proved that Gladiolus can be very well cultivated under open condition throughout the year without impairing the quality. The same was later demonstrated in the farmers' fields also. But only some farmers are continuing with the cultivation of Gladiolus. Gladiolus

cultivation is a profitable venture and the net profit mainly depends on the market price and productivity. Labour, planting material, manures, fertilizers, pesticides and management are the major inputs required for successful cultivation and high productivity of the crop. Planting material is very expensive and farmers have to spend huge amount of money for purchasing them. Average cost of small to large size corms varies from Rs.2 to 4. Selling price of gladiolus spike at the field level ranges from Rs. 2.50 to 3.50. However, if growers avail the subsidy extended by the Directorate of Agriculture, Govt of Goa, they will get some income in the first crop itself. Farmers need not purchase corms for the second crop. Therefore, the net income from second year onwards will be more as cost production is very less. Benefit cost ratio in the first year and second year is 1:1.9 (includes the value of corms) and 1:8 respectively.

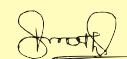
Other crops like Heliconia, Ginger lilly, cut foliage plants like asparagus, cordyline, philodendron, monstera, palms etc. are very much suited for cultivation under existing coconut plantation by effectively using the unutilized interspace. This will give additional income to farmers since many years the price of coconut is unstable due to global competition.

Cultivation of cut flowers like Gerbera, Anthurium and Orchids are being taken up under naturally ventilated polyhouse and shade net as well in Goa. In case of Gerbera, the breakeven is achieved within one year. It is more economical to go for 500 m² unit than 200 Sq.m considering intensive cultivation practices and better utilization of resources. Wholesale gerbera prices are up to Rs.3 per flower at Goa and prices increases to Rs.4 to 5 during festival and marriage seasons and that increases net profit substantially. The capital investment is Rs. 3.4 lakhs for 500 sq.m unit but after subsidy from NHM programme, it comes to 1.7 lakhs. The recurring costs are 1.25 lakhs per year. Total flower production is 1 lakh per year, hence the return is Rs. 3.5 lakhs in a year. The net income after deduction of all the costs is Rs. 39,000 in the first year. During second and third year, net income increases considerably since there is no fixed cost for the structure and planting material.

The important steps favouring for successful floriculture are to be taken by the policy makers and Government of Goa. The major

problem faced by the existing farmer who is producing the cut flowers is marketing. Though the quality of flower produced locally is at par with the imported ones from neighbouring states and even some time valued more because of extended shelf life, stiff competition from the established florists is a major constraint. This can be addressed by establishing a co-operative venture like mechanism or buy-back arrangement by the florists especially for high value crops like cut flowers. The second problem is transport of flowers from different areas. Since most of the polyhouse or open fields are established by small and medium farmers, procuring flowers from different areas would be practically difficult. Instead, co-operative ventures can have their own refrigerated transport vehicle. Secondly for big players and export oriented production, an area has to be identified exclusively for cultivation of flowers such as floriculture parks or special agri export zones. This will facilitate easy and efficient handling of inputs, flowers, transport etc. The most important problem faced by the florists is irregular supply. What the export market requires is continuous supply of required quantity and quality at an appropriate time. This can be achieved only when an exclusive area is earmarked for floriculture purpose with necessary support from the Government.

Floriculture is a lucrative enterprise having an edge over other horticulture and field crops. The flower business is growing at the rate of 7-8% per annum in India even when there is a fall in other agriculture production. At the beginning, hi-tech cultivation of flowers was confined to corporate houses and big farmers with huge land and capital, but, of late it has been successfully taken up by other sections of society like unemployed youth, women and small farmers. Hence, the strategy to promote floriculture should be on the line of cultivation of cut flowers like gerbera, anthurium and orchids by clusters of small and medium farmers under naturally ventilated polyhouse, promotion of shade loving cut foliage cultivation in the interspaces of coconut and other plantation crops, setting up of co-operatives to address the issues related to Hi-tech horticulture in general and floriculture in particular in the state of Goa.



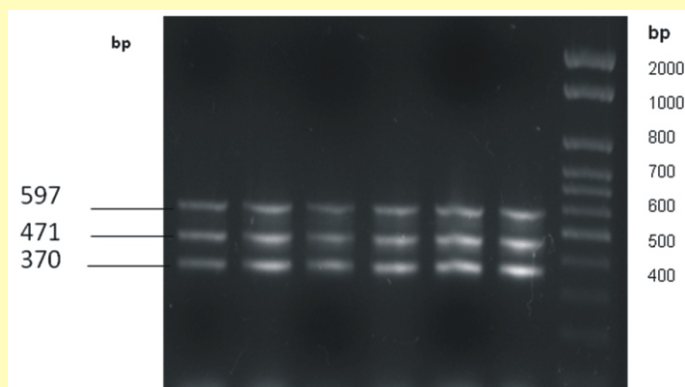
V.S. Korikanthimath

RESEARCH HIGHLIGHTS

Molecular epidemiology of *Listeria*

Studies on genetic diversity of *Listeria* associated with humans, animals and foods in India has been initiated. The study would generate data on virulence factors and epidemiology of *Listeria* associated with humans, animals and foods in India. The project work is expected to provide information on the diversity of *Listeria* isolates in India from

environmental, food processing, animal husbandry and clinical sources from all over India. To study the genetic diversity of the *Listeria*, strains from various sources namely, milk and milk products, fish and seafood, wild life, poultry, meat and processed meats, animal clinical cases and human clinical cases isolated/collected from different places in India have been characterized biochemically and with *in vitro* assays before attempting for serotyping and virulence gene profiles. The strains have been maintained for further studies by lyophilization. Preliminary results suggested *Listeria monocytogenes* 4b to be major serotype prevalent in India. Significant diversity was observed among the strains by pulsed field gel electrophoresis. Further studies are in progress to add more strains in our collection from various sources particularly the human clinical cases.



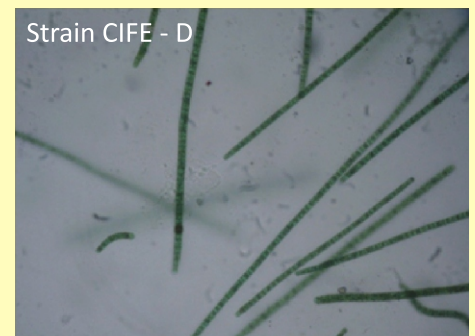
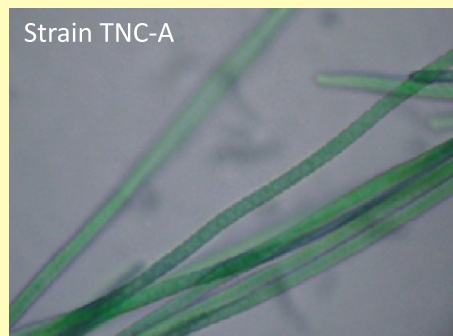
Growth studies, production methodology, feed formulation and feeding live feeds, *Spirulina* and *Moina* to ornamental fishes.

A series of experiments on growth and production of *Spirulina platensis* and *Moina*, feed formulation and feeding the live feeds and incorporated feeds to selected ornamental fishes, conducted at the Institute have indicated overall best growth performance with few strains (CIFE-D and TNC-B). Growth between 10th and 20th days was slower followed by a faster growth phase. For indoor culture in zarrouk medium, 24 hrs artificial lighting with just swirling twice a day gave best growth result. Thirty day old culture was suitable for use in reinoculation. Outdoor experiment with natural light favoured better growth. A strain (TNC-A) of *Spirulina platensis* was selected for mass culture in 1000 litre fibre glass tanks. The experiment gave a production of 300 to 800 g wet weight of biomass in 30 to 40 days per 1000 litre.

Based on the trials conducted a methodology for mass culture of *Spirulina platensis* was developed. *Spirulina* given in wet and powder incorporated feed forms gave same growth effect as that of standard balanced feed.

Gourami adults were choosy and fed on wet *Spirulina* as well. Guppy young ones fed voraciously and tripled in size in 30 days indicating that live *Moina* and *Spirulina* can be good combination feed for weight gain in young ones. Composite feed incorporating live *Spirulina* and *Moina* and formulated standard feed were ideal source of all nutrients to get best growth results in Shubunkin.

Results suggested the possibility of use of freshwater fish waste, snail and chicken liver as non-conventional protein sources in developing the nutritionally balanced cost-effective practical diets of sword tail fingerlings. Fish fed 40% protein and 6% lipid had significant growth and nutrient utilization in terms of weight gain, specific growth rate, food conversion ratio and protein efficiency ratio. The study results indicated that while the growth performance of *Xiphophorus helleri* was significantly better ($p < 0.05$) in fish fed at the vitamin E level of 300 mg/kg diet, the breeding performance was significantly better ($p < 0.05$) at 400.0 mg/kg diet.



Geographical distribution of kokum in Goa

Kokum, botanically *Garcinia indica* Choisy (Thours), is a commercially under-utilized perennial tree species, found wide spread as a native species in Goa reportedly in an area of 1,200 ha. The trees are found naturally in the hill slopes, forests, rocky plateaus, roadsides, farm bunds, stream bunds etc. either single or in clusters of 2-3 naturally co-existing in the ecosystem along with other forest and fruit trees especially like karonda, jamun etc. An attempt was made to study the geographical distribution of Kokum in Goa state.

Goa comprises of eleven talukas namely, Pernem, Bardez, Tiswadi, Bicholim, Ponda, Sanguem, Sattari, Salcette, Mormugoa, Quepem and Canacona running from north to south. Several villages in all the talukas of Goa were surveyed for the naturally occurring kokum trees, which are of seedling origin. The latitude, longitude and altitude of the spot, where the accession is located were recorded using GPS. The GIS data was used to plot the accessions on Goa map using software "DIVA-GIS" Version 5.2. Besides studying the spatial distribution of accessions, the variability was estimated using the software. Maps on the distribution pattern, diversity and richness were generated

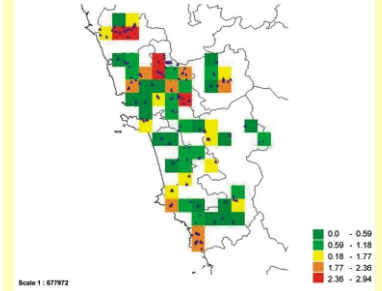
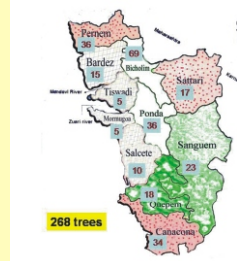
with the help of point-grid-analysis using simple method. In addition such grid maps generated depicted the distribution of biological diversity, and identified "hotspots" and areas that have complementary levels of diversity.

In the study, the kokum accessions were located in coastal, mid lands and uplands of Western Ghats. Trees were found throughout Goa, with a lean population in central parts of Sanguem taluka. Very rich distribution was noticed in talukas like Bicholim and Ponda (non-coastal talukas) and Pernem, Quepem and Canacona (talukas housing all types of habitats). Therefore, the distribution of kokum ranged from coastal to high ranges of Western Ghats. The accessions were not found in sandy coasts of Goa, but the ranging elevations proved that the sub-mountainous tracts of Western Ghats are believed to be the centre of origin of kokum. Diversity analysis revealed that the maximum diversity was found in Bicholim, Pernem and Canacona talukas among the study areas. Such geographical pockets are considered to be the "micro hotspots". In the present studies, the promising accessions viz., Satarda-7, Kasarpal-5, Borim-2, Savo Verem-9 etc. were found in secondary forest lands on slopes ranging from 31 to 48 m

above MSL in mid-lands rather than in slopes adjoining sea coasts.

Such rich diversity is posed to dangerous threats of genetic erosion due to urbanization and other developments. Systematic identification, documentation and conservation of genetic diversity of kokum either *ex situ* or *in situ* are the need of the hour. In addition, selection, propagation and commercial cultivation of hand picked accessions from these talukas are being attempted.

Map of Goa showing distribution of kokum accessions (268) under study



NEW INITIATIVES

Agro-eco tourism cell established

Agricultural Technology Dissemination Centre (ATDC) at ICAR Research Complex for Goa, Ela, Old Goa was established to provide a 'single window' delivery system for the products available from ICAR Research Complex for Goa to the farmers and other interested groups as a process of Innovation in Technology Dissemination at the Institute level and promotion of Agro-Eco-Tourism.

Since Goa has carved a niche as internationally renowned tourist destination the ATDC of this institute has taken up the promotion of agro-eco-tourism on top most priority. It is the endeavor of this institute to promote agro-eco-tourism in the backdrop of main stream tourism in Goa and adjoining regions.

Services offered by ATDC for promoting Agro-Eco-Tourism

Sensitizing interested farmers and formulations of norms for establishing Agro-tourism units.

Providing new technology, new package, and innovation to farmers.

Promote the existing well reputed farms/plantations in Goa Formulating priorities and reorienting research programmes to promote Agro- Eco- tourism.

Involving local people for development of rural areas as hub of agro-eco-tourism.

Offering guidance and helping farmers for developing spice

gardens/plantations, herb garden, floriculture, biogas plant, vermi-compost unit, rabbitry, poultry units, goatery, piggery and integrated farming units

Making efforts to include agro-eco-tourism centres of Goa and adjoining areas in the world tourist map.

As has been realized already, agriculture alone can no longer be dependent upon to provide the economic stability for rural villages and communities. But the integration of tourism and agriculture activities will open up new vistas and can play key role as new employment partners for rural communities thereby improving the economic status. Besides this, Agro-eco tourism forms a potential "Alternative to routine tourism" which is "Farm based and harmonious with nature".

Agro-eco tourism can bring about many more added benefits in rural areas by way of assisting farming and other rural families to use existing resources effectively in order to improve income and the viability of the farm business, providing interactive opportunities to the villagers with national and international tourists right in their own places thereby enhance understanding of the outside world, improving the infrastructure facilities and standards for tourists and local people, enriching the heritage and culture of the region, increasing foreign currency earning through "Rural Windows" and bringing about overall transformation of rural sectors into active functional centres.

Goan Feni gets GI Status

Feni is an Indian liquor made from the juice of the cashew apple. Feni originated in Goa. Goan feni has been registered by Government of India as a geographical indication under Geographical Indication of Goods (Registration and Protection) Act 1999. Certificate to this

effect has been issued to Goa Cashew Feni Manufacturers and Bottlers Association, and Department of Science and Technology and Environment, Government of Goa. This would allow to claim the sole right to term drink created in the region as 'Goan Cashew Feni'.

In the traditional method of making cashew feni, the cashew apples are manually crushed in a basin with an outlet for the juice. The juice is collected in a huge earthen pot, which is buried in the ground. The juice is then distilled in earthen or copper pots. The distillation process is repeated three times. The first distilled juice that is obtained is known as Urrack. The second drink is known as Cazulo which is slightly stronger than Urrack. The final juice that comes out is very powerful and is known as Feni. This product has a pretty long shelf life is liked much by people. High-grade feni is 42% alcohol by volume. There are known to exist around 4,000 such traditional mini-distilleries or stills in Goa

that manufacture cashew feni. About 75 per cent of stills making cashew feni are in north Goa while the rest are in south Goa.



PARTICIPATION IN SEMINAR / SYMPOSIA / WORKSHOPS

V. S. Korikanthimath

National Seminar on socio-economic and legal perspectives of environmental protection at MES, Sirsi during 2-3 May, 2009.

Organic production and eco tourism-an emerging concept for socio-economic upliftment at Project Directorate for cropping systems research, Modipuram, Meerut on 9 June, 2009.

9th Agricultural Congress at Shere-e Kashmir University of Agricultural Sciences & Technology, Srinagar during 22-24 June, 2009.

S Subramanian

96th Indian Science Congress organized by ISC Association, Calcutta and North East Hill University, Shillong, at Shillong during 3-7 January, 2009.

Workshop on Sustainable marine production organized by Centre for Coastal and Marine Biodiversity, Dr. Babasaheb Ambedkar Marathwada University, at Ratnagiri, 7-9 March, 2009.

K N Mohanta

Scientific Workshop at Institut National de la Recherche Agronomique (INRA), St. Peter Sur Nivelles, France on 27th March, 2009.

Ram Ratan Verma

4th world congress on conservation agriculture held at NASC Complex, New Delhi, 4-7 February, 2009

AWARDS AND RECOGNITIONS

Dr. K.N. Mohanta was awarded DBT Overseas Fellowship for the year 2007-08 by Department of Biotechnology, Ministry of Science and Technology, Government of India to carry out the Advance Research in Aquaculture Biotechnology at Institut National de la Recherche Agronomique (INRA), France for a six months period commencing from February, 2009.

Dr. K.N. Mohanta received the ICAR Award for outstanding Interdisciplinary Team Research in Agriculture and Allied Science for the Biennium 2005-06 from ICAR, New Delhi.

Dr. K.N. Mohanta was awarded the Young Scientist Associate Award 2009 in Fish and Fisheries Science by Bioed Research and Education Society, Allahabad, U.P.

Dr. Rajnarayan awarded Best KVK Professional Award by Society of Extension Education, Agri during 5th National Extension Education Congress 2009 held at CSAUAT, Kanpur during 5-7 March, 2009.

Dr V. S. Korikanthimath, Director received ISA GOLD MEDAL 2006 of Indian Society of Agronomy, IARI, New Delhi for Outstanding contribution to Agronomy during the National Symposium on "New Paradigms in Agronomic Research" held at Navsari Agricultural University, Navsari, Gujarat.



MAJOR EVENTS

Research Advisory Committee Meeting held

The third meeting of Fifth Research Advisory Committee was held during 15 -16 April 2009 at ICAR Research Complex for Goa. The Meeting was chaired by Dr. M. Mahadevappa, and attended by members. Dr. P. Rethinam, Dr. S.V. Deshmukh, Dr. P. D. Sharma and Dr. V. S. Korikanthimath. All the Scientists of the institute, Subject Matter Specialist and Programme Co-ordinator of KVK participated in the deliberations of the RAC Meeting. RAC was informed about important research activities, achievements and developments taken place at the Institute. The Chairman and the members of RAC visited all the laboratories, field experiments and large scale demonstrations in farmers field.



PERSONALIA

Foreign Deputation

Dr. J.R. Faleiro, Principal Scientist is on Sabbatical leave for a Post Doctoral assignment at the King Faisal University, Al Hassa, Saudi Arabia for a period of one year from 31-12-2008, to take up research at its Date Palm Research Centre on " Testing and Refining protocols for the area-wide management of red palm weevil (RPW) in date agro-eco systems of Al -Hassa, Saudi Arabia.



Dr. S.B. Barbuddhe, Sr. Scientist (Vet. Public Health) and Shri Ashok Kumar J, Scientist (Computer Applications) visited Institute of Medical Microbiology, Faculty of Medicine, Justus -Liebig University, Giessen, Germany during 28th Jan to 10th Feb 2009 under Indo-German Consortium for Epidemiology and Comparative Genomics of *Listeria* (InGelis) funded by DBT, Govt of India.



Dr. K.N. Mohanta Sr. Scientist is on deputation for undergoing Biotechnology Overseas Associateship (2007-08) on the subject titled' Assessment of catch up growth of fish after feed deprivation and refeeding and associated metabolic changes in nutrient mobilization and gain' at INRA, UMR 1067 Nutrition, Aquaculture & Genomics, Pole d'Hydrobiologie, BP 3, 64310 Saint-Pee-sur-Nivelle, France for a period of six months from 1-2-2009 to 31-7-2009.



Appointments

Dr. S.K. Das was appointed as Principal Scientist (Livestock Production and Management) -w..e.f 18-5-2009.
Ms. S.A. Safeena was appointed as Scientist (Horticulture) -w.e.f 10-2-2009.

Promotions

Dr. A.R. Desai was promoted from Scientist Selection Grade to Sr. Scientist.
Dr. R.Ramesh and Dr. M. Thangam were promoted from Scientist Sr. Scale to Sr. Scientist.

Retirement

Smt. Angelica Miranda, S.S.Gr.II voluntarily retired w.e.f 1-4-2009.

Sad Demise

The Institute condoles the death of Shri. Gangadhar Dhargalkar, S.S.Gr.III who expired on 15-4-2009.

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Published by : **Dr. V.S. Korikanthimath**, Director, ICAR Research Complex for Goa, Ela, Old Goa -403 402, Phones (0832) 2285381,2284678,2284679
Fax (0832) 2285649, Grams: RESEARCH, **VELHA** GOA, E-mail:director@icargoa.res.in, website:http://icargoa.res.in,
Printed at : **Sahyadri Offset Systems**, Corlim, Goa. Ph.: 2285704