transporting their produce through lorry and train and sell the flowers at distant towns. Because of this they paid high cost for transporting their produce.

"No cold storage facilities available" was expressed as the ninth problem encountered by 23.33 per cent of the respondents. If cold storage facilities are available, during the high production period the flowers can be stored and marked in the off-season period.

"Lack of co-operative credit facilities" was reported as the tenth problem by 14.17 per cent of the respondents. No credit is given for flower cultivation by institutionalised credit agencies like co-operative societies. So, the flower cultivators have to get the loans from private money lenders of from commission agents paying higher rate of interest.

"Non-availability of flower processing industry" was reported as eleventh problem by 8.33 per cent of respondents. Suitable industries, either by private or co-operative basis may be established for aromatic oil extraction which would fetch higher price.

Conclusion

The study leads to conclusion that majority (54.17%) of the flower cultivators preferred polythene bag as the packing material. More than half (51.67%) of the flower cutivators reported that receipt of advance was the reason for the selection of market. The formost and predominant problems faced by majority of the flower cultivators were the price fluctuations (73.33%), more commission (60% and in adequate transport facilities. Special care showed be taken to establishing suitable marketing infrastructure for flower crops.

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Indegenous technologies for sustainable farming

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R. NETAJI SEETHARAMAN AND R. VELUSAMY

Centre for Agricultural and Rural Development Studies, Tamil Nadu Agrl. University, Coimbatore-641 003, Tamil Nadu.

Abstract : Four micro level and one macro level researches were conducted to document and analyze the Indigenous Technical Knowledge (ITK) prevalent among the farmers in Tamil Nadu. The ITKs were collected from farmers in wetland, garden land and rainfed farming systems available in the state. As many as 1200 ITKs were documented. They were analyzed and grouped. They were found to be relevant to agriculture and allied activities. The document ITKs were analyzed for their rationality by checking them with subject matter specialists and extension personnel. The ITKs were checked with the farmers to understand their level of awareness and extent of adoption by farmers and dairy farmers. Nearly 66 per cent of the collected ITKs were judged as rational. Among the farmers, 42.78 per cent had low awareness followed by 32.09 and 25.13 per cent who had medium and high level awareness respectively. The adoption level of ITKs in agriculture was low with 43.85 per cent followed by 31.55 and 24.60 per cent who had adopted at medium and high levels respectively. Regarding awareness about ITKs on dairy 48, 30 and 22 per cent had low, medium and high levels respectively. Almost similar trend was noticed in the percentage of adopters of ITKs on dairy. The paper will highlight researches specifically conducted in different farming systems in Tamil Nadu. It contains suggestions on field testing, standardising and blending ITKs with modern technologies for recommending them to the farming community through the field extension personnel. *(Key Words : Farming systems and indigenous knowledge)*

Attaining food security had been a major policy issue since independence. Apporpriate polcy support for agriculture, building of a strong agricultural research and education system coupled with an extension system had helped in achieving household food security as well as the required national confidence to meet the growing food demands despite a growing population. Food grain production

increased from 72 million tonnes in 1965-66 to a record level of 203 million tonnes in 1998-99. The emerging production scenario, higher economic growth, population exposition and shifts in dietary pattern will also change in supply and demand profiles of food. These will call for a critical review of the current food situation as also the future needs and assessing whether appropriate policies and programmes for agricultural research and development in place.

The productivity gains needed by small farmers will be possible only if agricultural research systems are mobilised to develop improved agricultural technologies and techniques and if expansion systems are strengthened to assure dissemination of the improved technologies and techniques to both male and female farmers. Although specific research priorities should be determined separately for each region, additional research is necessary to develop drought tolerant and more effective use of locally available resources. The wealth of knowledge available with the farmers on genetic diversity, cultivation practices and utilization potentials shall be effectively tapped to revitalise the agricultural research and evolve meaningful technologies which the farmers need. This is possible only if farmers are also made partners in research.

Unfortunately, the green revolution proponents did not foresee th consequences of importing 'technological packages' that had been formulated under very different ecological and socio-economic conditions. In majority of the cases, new varieties could not surpass local varieties when managed with traditional practices. Results of studies by scientist working in farmer's field suggest that, the only way to formulate technology appropriate and adaptable to farmers' criteria and resource base is by analyzing the socio-economic and biophysical constraints of farm production. This requires both an econoligcal and economic approach which formalizes the body of complex relationship implicit in traditional farming system. Understanding farmers existing technology and farming systems is the fundamental step in the design of appropriate development strategies.

There are number of indigenous technologies which are being used by farmers and the rural communities. Such indigenous technologies relate to crop production, crop protection, conservation of soil and water. They also relate to management of crops, controlling of pest through naturally available plant products, agro processing and storage techniques.

Findings

Limited efforts alone have been taken to systematically and scientifically identify the indigenous knowledges, review, assess and upgrade them on the light of present modern knowledge. However, the department of Agricultural Extnsion and Rural Sociology of Tamil Nadu Agricultural University has made some pioneer attempts to document and analyse the indigenous technologies available in Tamil Nadu.

The salient findings from five researches conducted since 1986 are presented and discussed in this paper.

The findings of Selvanayagam (1986)

He has conducted a study entitled "Techno-cultural profile of dryland farmers" in Tirunelveli district of Tamil Nadu state with 100 dryland farmers.

He has identified 50 indigenous technologies available in dry farming tracts. They in turn relate to the following aspects of farming:

Sl.No.	Type of indigenous items	Number	Per cent
1.	Climatology	13	26.00
2.	Season	2	4.00
3.	Soil and soil moisture	8	16.00
4.	Ploughing and intercultivation	3	6.00
5.	Seeds and sowing	4	8.00
6.	Manure and manuring	5	10.00
7.	Plant protection	6	12.00
8.	Weeds and weeding	2	4.00
9.	Harvest and post harvest techniques	3	6.00
10.	Crops and cultivation	4	8.00

He has also analysed the indigenous technologies for their rationality. Thus he has classified them as weekly held or strongly held rational or irrational indigenous technologies.

Overall strength and rationality

Among the 50 indigenous items identified, the strongly held and weekly held were equally distributed.

Regarding rationality as a whole 66 per cent of the selected indigenous items were irrational and only 34,00/- per cent were rational.

The findings of Gnana Deepa (1991)

She has conducted the research entitled "Techno-cultural profile of rice farmers" in Tirunelveli district of Tamil Nadu state with 100 rice growers.

She has identified and documented 60 indigenous knowledge items relating to wetland farming. They intern relate to the following aspects of rice farming.

Sl.No.	Various aspects	Indidenous No.	Knowledge
1.	Rainfall	17	28.33
2.	Season	3	5.00
3.	Soil	3	5.00
4.	Seeds	2	3.33
5.	Ploughing and intercultural operations	4	6.6
6.	Manure and manuring	4	6.66
7.	Irrigation	8	13.33
8.	Plant protection	6	10.00
9.	Harvesting	4	6.66
10.	General	9	15.00

She has also analysed the strength and rationality of indigenous knowledge items identified.

Sl.No.	Category	Rational	Irrational
1.	Strongly held indigenous technologies	21	20
2.	Weekly held technologies	3	16

The findings of Balasubramaniam (1992)

He has conducted research entitled "Techno-cultural profile of dry land farmers" in Coimbatore district of Tamil Nadu state with 120 dry land farmers.

He has identified 23 indigenous knowledge items in various aspects of dryland farming. The following are the indigenous knowledge items relating to various aspects of dryland farmig with adoption level.

Indigenous knowledge	Adoption percentage
Preparatory cultivation	
Summer ploughing	100
Seed and sowing	
Cow dung coating for cotton seeds	100
Soaking sorghum in cow urine	100
Soaking bengal gram in water	100
Soaking sorghum in common salt	41
Manures and manuring	
Cattle ploughing	93
Mixed cropping	
Sorghum raised as mixed crop with lab-lab	100
Intercultural opration	
Crop plough	74

Plant protection	
Cow dung cake used as burrow fumigant	100
Displaying crow's careass for scaring birds	100
Beating empty iron drums toward off bird	100
Tieing polythene sheet to a pole	77.5
Raising caster as a border crop in cotton field	80
Night fire to prevent rod hairy caterpillar	30
Digging the fild burrow to kill rats	87
Black cloth tied with a long pole	72
Dusting ash on the sorghum	91
Throwing stones with help of leather rope	77.5
Post Harvst: Coating redgram with red soil	100
Mixing green gram with ash	87
Mixing green gram with sand	72
Mixing sorghum with dried neem leaves	100
torage of grains in Madkudhir	100

The findings of Kalaivani (1992)

She has conducted research entitled "Techno-cultural profile of garden land farmers" in Coimbatore district of Tamil Nadu state with garden land farmers.

She has identified 62 indigenous knowledge items in various aspects of garden land farming. The following are the indigenous knowledge items relating to various aspects of garden land farming.

Sl.No.	Indigenous knowledge	Number	Per cent
1.	Season and climate	19	30.65
2.	Soil management	7	11.29
3.	Farm level	8	12.90
4.	Intercultural operations	7	11.29
5.	Seeds and sowing	3	4.84
6.	Manures and manuring	5	8.06
7.	Weeds and weeding	3	4.84
8.	Plant protection	7	11.29
9.	General	3	4.84

Overall strength and rationality of indigenous knowledge

Among the 62 indigenous knowledge items strongly held indigenous items occupied more percentage than weakly held indigenous knowledge items. Among the strongly held indigenous were more than the irrational indigenous knowledge items.

The findings of Somasundaram (1995)

The study entitled "Indigenous knowledge in farming systems" was conducted in alal the seven agro-climatic zones of Tamil Nadu state with 300 aged and experienced farmers.

He has conducted the study in two phases. During the first phase, the indigenous knowledge items associated with agriculture and allied activities were identified through informal interview with 300 farmers representing all the 7 agroclimatic zones of Tamil Nadu. Though he has identified about 2000 indigenous knowledge, only 876 items on agriculture representing 10 crops viz. rice, sorghum,. cumbu, ragi, redgram, blackgram, groundnut, gingelly, cotton, sugarcane and general agriculture and 101 indigenous knowledge items on dairy were selected for further analysis. In the second phase he has checked for the awareness and adoption of the selected indigenous knowledge items with 187 farmers who were selected at random again from the seven agro-climatic zones. He has contacted 48 crop production scientists, 39 crop protection scientists and 45 veterinary scientists to judge the rationality of the selected 400 indigenous knowledge items through questionnaire.

Indigenous knowledge on agriculture

There were 1862 indigenous knowledge items collected from all the seven agro-climatic zones of Tamil Nadu as detailed below:

Sl.No.	Agroclimatic zones	Number	Per cent
1.	North zones	259	13.91
2.	North-westren zone	285	15.31
3.	Western zone	317	17.02
4.	Cauvery Delta zone	338	18.15
5.	Southern dry zone	435	23.36
6.	High rainfall zone	145	7.79
7.	High altitude zone	83	4.46
	Total	1862	100.00

There were 13-18 per cent of indigenous knowledge items in all parts of the Tamil Nadu. The percentage was slightly higher in Southern dry zone, the reasons might be due to its large geographical area and more number of crops grown. Since high rainfall zone was having only a limited area the indigenous knowledge items were found to be limited.

Farming systemwise indigenous knowledge items

Sl.No.	Farming system	Number	Per cent
A. Single farming system			
1.	Wet land	98	111.19
2.	Garden land	128	14.61
3.	Dry land	162	18.49
	Total	388	44.29
B. Double farming system			
4.	Wet land + garden land	214	24.43
5.	Wet land + dry land	5	0.47
6.	Garden land + dryland	65	7.42
	Total	284	32.42
C. All farming system			
7.	Wet land + garden land + dry land	204	23.29
Total		876	100.00

Out of 876 indigenous knowledge items 44.29 per c ent were found suitable to either dry, wet or garden land system and 32.42 per cent were suitable to any two systems. However, nearly one-fourth (23.29%) of the items were suitable to all the three farming systems.

Indigenous knowledge on allied activities

He has identifid indigenous knowledge items in allied activities to agriculture and classified. He has identified 217 indigenous knowledge items in dairy, 21 items in goat rearing and less number of indigenous knowledge items in sheep rearing, rbbitory, piggery and poulty.

The collected indigenous knowledge items were assessed for awareness and adoption among the farmers. He had found that 42.78 per cent of farmers had low awareness, 32.09 per cent with medium awareness and 25.13 per cent were having high awareness. He has also identified 43.85 per cent of farmers as low adopters followed by 31.55 per cent under medium adoption category and 24.60 were high adopters.

Theoretical and Practical Implication and Vision for Next Decade

Of late, the scientist and environmentalist, have come to understand that the modern farming tchnology, though helpful in increasing the production, are largely responsible for polluting the environment. They are also convened that at this rate of adoption of modern technologies the sustainability in farming could not be achieved. All the people who are concerned on the environment are focussing their attention in identifying viable and appropriate alternatives to the modern technologies. It is needless to emphasis that development of natural products and traditional knowledge, along can provide the solution. Indigenous technologies as found out by various researchers, are found to be available in plenty and are on different aspects of not only farming but also on every farm activity. The identificatiion, documentation, test verfification and standardization of indigenous technologies are some to yield viable and appropriate alternatives to the presently followed modern technologies. Secondly, there is a large scope for blending the indigenous technologies with that of modern technologies in an effort to maintain the present level of productivity but at the same time achieving the much needed sustainability in agriculture.

Strageties

- Indigenous knowledge have strong roots in rural culture. All the study reveals that there were number of indigenous technologies available on agriculturd and allied activities which may serve as suitable alternative to modern technologies.
- The indigenous technologies may be analysed for their productivity, stability, sustainability and cost-benefit ratio by a multidisciplinary team including biological and social scientists.
- The indigenous technologies should be test verified for each agro-ecological conditions. These technologies can easily be disseminated by the extention workers since they are already deep rooted in the present culture.
- There should be a national level body for documentation, test verification and developing as modern agricultural technologies suitable to each agro-ecological regions.

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Effect of growth regulators on biochemical attributes, grain yield and quality in pearl millet (*Pennisetum glaucum* L.R. Br.)

SIVAKUMAR, R. KALARANI, M.K. MALLIKA VANANGAMUDI AND SUJATHA, K.B.
Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore641 003, Tamil Nadu.

Abstract : The effect of foliar spray of brassinosteroid (BR), triacontanol, salicylic acid (SA), naphthalene acetic acid (NAA) and mepiquat chloride (MC) on pearl millet was studied. These growth regulators, increased chlorophyll, soluble protein, nitrate reductase activity (NRase) indole acetic acid oxidase activity (IAAO) and uptake of nitrogen (N). Grain yield, grain protein and sugar content were also enhanced by these growth regulators. Among the treatments, BR (0.1 ppm) and triacontanol (10 ppm) were found to be more effective. *(Key words: Pearl millet, Brassinosteriod, Triacontanol, Napthalene acetic acid, Salicylic acid, Mepiquat chloride, Soluble protein, Nitrate reductase activity, Indole acid oxidase activity)*