SOIL CONSERVATION SOCIETY OF INDIA

SOIL AND WATER CONSERVATION Today

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IN THIS ISSUE

International Decade of Soils 2015-2024

FROM THE PRESIDENT'S DESK

The waste is a natural by-product of disposed or unused material after primary use. Since, there are no proper technologies available for effective management of waste, hence, it is considered as a menace and becomes a source of pollution and develops a major human health hazard. Generation of less waste material re-use of consumable recycling of waste material and production valuable natural resources from waste material are considered as good practices. Crop residue generated to the tune of 550 mt per year that needs to be recycled to improve soil health. Further municipal solid waste composting needs to be promoted with a government subsidies to ensure waste to be converted to soil amendment. This will recycle nutrients back to soil. They help consume valuable natural resources and energy as well as lowering of environmental damage caused by socio-economic developments which attract the idea of sustainable development. This is challenge before us in the present situation.

There are substances and products which are generated during waste management and also develop on emerging major sector for employment to meet the livelihood needs of the of growing population in the county. Giving the magnitude of waste generated, innovative waste conversion processes can create micro-entrepreneurship opportunities at a large scale. In India, the potential of waste to wealth enterprise is very high. Presently much has not been done. Increasing opportunities for this enterprise can have manifold advantages. It can bring back useless, discarded waste products into economic use and lead to

1. Reduction of pressure induced by waste on the environment.
2. Creation of opportunities for income and employment generation.
3. Impact quality of life.

These issues related to sustainable development, organic farming, agro-ecological farming methods are gaining in popularity. These rely on ecological processes to sustain the health of soil as well as treating farming as an integrated, holistic, interconnected process of food production by optimizing the farm in design and closely knit nutrient

and resource recycling. Instead of chemical fertilizers and pesticides, compost, green manure and bone meal are key ingredient in organic farming and also on non-chemical modes of pest and disease control. Consciousness towards healthy lifestyle has seen organic farm production and trade emerging as an important sector in India.

Dr. Suraj Bhan
President SCSI

DEVELOPMENT OF A GYM CYCLE BASED HEALTH FRIENDLY WATER PUMPING SYSTEM

Jitendra Sinha and Pankaj Sinha
IGKVV, Raipur

We talk about water harvesting, we talk about health issues - burning some calories, losing some fat, we talk about environment issues – judicious use of precious resources, we talk about operating drip system of irrigation without diesel, electrical or solar power; we talk about minimizing the carbon and water footprint and we talk about being in harmony with natural resources that too in an environment and health friendly manner for sustainability. The ultimate challenge to address these issues is lifting the water to some height. The master piece set up presented herein is an honest attempt to address all such issues.

The socio-economic conditions of peoples living in villages as well as urban areas of India including Chhattisgarh state, human muscle power can be a good way of fulfilling the energy demands for doing works like water pumping. It is also well known fact that pedaling is the most efficient way of making use of human muscles. Like water, energy is also an important part of our living particularly in urban areas. Increasing cost and decreasing sources have compelled to look for alternative sources of energy and have become the need of present time. The lifting of water for agriculture and drinking purpose is also of great importance in rural areas. Sermaraj (2010) conducted an experiment on the design and fabrication of the pedal operated reciprocating water pump. Traditionally there are different types of manually or animal operated pumps available for lifting and carrying water, some of which are superior to others for various purposes. There is always much scope for improvement in the conventional pumping system than evolving new water lifting techniques. Several methods for lifting of water are available for small urban areas. Lifting or moving water without electricity, diesel or solar power may require muscle power. The problem is more pronounced in un-electrified and frequent power cut areas. Under such circumstances the human powered water lifting is the solution. However, if the water lifting mechanism is made to operate in a rotary mode with gym-cycle the problem could be solved to a great extent with exercising mechanism in it. The aim of the work is to efficiently utilize the human energy for lifting and moving the water through the improvised pedal operated water pumping system.

SETUP and TESTING

The setup was developed at field laboratory of **Department of Soil and Water Engineering**, SVCAET & RS, Indira Gandhi Krishi Vishwavidyalaya, **Raipur Chhattisgarh** under the university funded project entitled "Improvisation of a common gym cycle as water pumping device". To improvise a common gym cycle as water pumping device, some attachments have been done. Initially the wheel of the gym cycle was opened and a V belt has been inserted. For attaching a centrifugal pump, a frame of mild steel plate has been fabricated and attached at the base of gym cycle with suitable fasteners. This way the wheel of gym cycle is attached with the pump pulley. The setup is very well described through plates as detailed below:

The experimental calculation for RPM generated on the pump pulley by an average adult operator was measured with the help of a tachometer. The RPM generated at the pump pulley by an average adult shown in Table 1.

Table 1: RPM generated at the pump pulley by an average adult

S. No.	Average adult operate per minute	RPM	
1	Gym cycle pedal	= 50 x 1	50
2	Gym cycle wheel (1 revolution of Gym cycle pedal = 6 revolutions of gym cycle wheel)	= 50 x 6	300
3	Pump pulley (1 revolution of Gym cycle flywheel = 5.5 revolutions of pump pulley)	= 300 x 5.5	1650

A master piece set up addressing those issues have been developed for lifting and carrying water and tested for different suction lifts varying from 1 to 3.58 m, different discharge heads varying from 0.27 to 3 m and for carrying different horizontal distance from 1 m to 30 m. The system can work for a maximum suction lift of 3.58 metres in normal pedaling condition (Table 2). It can be seen that the discharge varying from 0.30 lps to 0.64 lps under different conditions. Based on the result obtained it is concluded that common gym cycle can be improvised to work as human pedal powered water lifting device and provide water for small field, open gymnasium, hostels etc. without electrical, solar or diesel power in an environment and health friendly manner. The system is based on power of positivity as while burning some calories and losing some fat; the energy can be utilized for some meaningful work. At a total head of around 3 metre it is giving a discharge of 2100 lites per hour. Fill up a 2000 litre tank with harvested water and gravity drip system can be operated. It is also very well addressing the challenge of scientific community of minimizing carbon and water footprint.

Table 2: Testing of pump discharge at constant horizontal pipe length 10 m and discharge head 0.27 m at different suction lifts

S. No.	Suction lift (m)	Discharge		
		Lps	lpm	lph
1	1	0.583	35	2100
2	2	0.56	33.60	2016
3	2.7	0.44	26.30	1578
4	3.3	0.383	23	1380
5	3.58	0.30	18	1080

Common Gym Cycle

Centrifugal pump without motor

V belt

Suction Pipe

Foot Valve

Clamp

Fasteners

Setup and testing of developed pumping system

Foundation plate

Sensor

ANNOUNCEMENT

Virtual Brain Storming Session

on

Restoration and Judicious Utilization of Degraded Lands - Meeting the Bonn Challenge!

On 28th November, 2020 at 04:00 pm (IST)

To be organized by

ISCO
International Soil Conservation Organization

International Soil Conservation Organization (ISCO), India

It has very well known that on 25th September 2015, the Sustainable Development Goals (SDGs) were formally adopted by the UN General Assembly. SDG 15 includes a target of Land Degradation Neutrality (LDN) focusing on combating desertification, restoring degraded land and soil, including land affected by desertification, drought and floods, and striving to achieve a land degradation-neutral world by 2030. Thus save the earth for the livelihood support of mankind. The Bonn Challenge: All the participating countries had agreed for a target of LDN of 150 Mha by 2020 and 350 Mha by 2030 at the global level.

Form link for participation:- https://forms.gle/D8wCYWho4VLxDnUx7

E-certificate will be issue to the participants

SOIL HEALTH MANAGEMENT UNDER ORGANIC PRODUCTION SYSTEM

Professor Sanjay-Swami

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The North Eastern Region (NER) has several unique features: fertile land, abundant water resources, evergreen dense forests, high and dependable rainfall, mega biodiversity and agriculture-friendly climate, yet it failed to convert its strengths optimally into growth opportunities for the well-being of the people. The high vulnerability to natural calamities like floods, submergence, landslides, soil erosion, etc. has resulted in low and uncertain agricultural productivity.

The concept of organic farming builds on the idea of efficient use of locally available resources as well as the usage of adapted technologies e.g. soil fertility management, closing of nutrient cycles as far as possible, control of pests and diseases through management and natural antagonists. There may be different management approaches for organic cultivation under different climates, locations and cropping systems. Unlike western developed countries where specialized farming is common, farms in India are mostly diversified in terms of crops grown, species and breeds of livestock raised. On-farm diversity is considered good for the organic farming. The North East Region (NER) of India is a hub of organic cultivation by virtue of its soil being organic by default. Approximately 18 lakhs ha of land in NER can be classified as "Organic by default." In the hills even today, agriculture remains predominately in the form of shifting cultivation locally known as '*Jhum*'. This practice has an in-built mechanism of sustenance, conservation and renewable system of resource management. Most of the farmers of this region are generally small and marginal in nature and cannot afford to buy the adequate amount of fertilizers and chemicals necessary for the crop production and hence they prefer organic cultivation. Therefore, the NER with its unique characteristics and agricultural practices can be exploited as potential area for the introduction of organic farming.

Soil health management

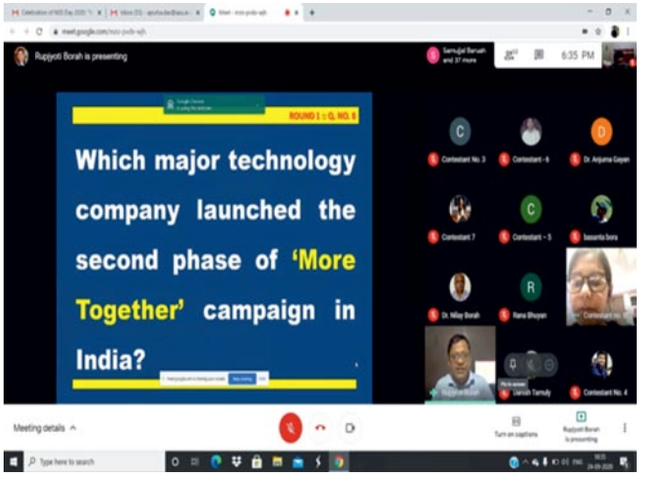
Deteriorating soil health is often quoted by farmers as a major reason for adopting organic management but they are not sure whether all the nutrients with the required quantities can be made available by the organic materials. Knowledge about the availability and usefulness of supplementary nutrient sources to enrich the soil plays a vital role in successful adoption of organic farming. The major components of soil health management under organic production system are crop rotation: as the selection of optimal crop rotation is important for soil fertility management, weed, insect and disease control; maintenance and enhancement of soil fertility through biological nitrogen fixation: Symbiotic and Asymbiotic N-fixation; addition of bulky and concentrated organic manures; use of soil micro-organisms, crop residues, biogas slurry, waste, green manuring azolla, biochar, organic formulations like Panchagavya, an organic product with the potential to play the role of promoting growth and providing immunity in plant system, made up of nine products *viz.* cow dung, cow urine, milk, curd, jaggery, ghee, banana, tender coconut and water, *etc*. Vermicompost and vermiwash have become major components in biological farming, which are found to be effective in enhancing the soil fertility and producing large numbers of horticultural crops in a sustainable manner. Farmers can fetch premium prices for organic produce along with conserving local crops which are common for farmers in their localities as local crops are more resistance to biotic and abiotic stresses. The NER is home to many niche crops like large cardamom, ginger, turmeric, Assam lemon, Joha rice, medicinal rice, Naga chilly (Bhoot Jolkiya), areca nut and Passion fruit with high market demands.

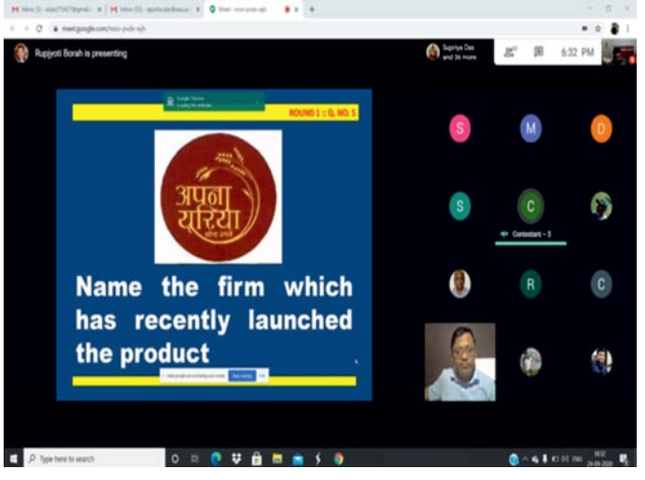
Organic farming, without doubt, is one of the fastest growing sectors of agriculture production in NER.

REPORT ON CELEBRATION OF FOUNDATION DAY OF SOIL CONSERVATION SOCIETY OF INDIA ON 24-09-2020

Assam State Chapter of SCSI Assam Agricultural University, Jorhat, Assam

The Assam State Chapter of SCSI had been organizing prize money science web quiz competition on the Foundation Day of Soil Conservation society of India. This year, the competition was held in online mode through Google meet from 06-00 pm to 08-45 pm on 24-09-2020 among the NSS units (inter college) of Assam Agricultural University. The participants for the quiz competition were nominated by eight NSS units under Assam Agricultural University. The participants and guests were greeted by Dr. Samiron Dutta, Vice President of Assam Chapter SCSI and the competition was inaugurated by Dr. Devajit Bhattacharyya, Professor and Head, Soil Science, AAU and President, Assam SCSI. Dr. Rupjyoti Borah, Extension Specialist, DoEE and Dr. Basanta Kumar Borah, Assistant Professor, Department of Agricultural Biotechnology conducted the competition as quiz masters. A total of 87 persons including students, teachers, retired teachers, guests from and outside AAU joined and participated in the quiz competition including the eight main round participants. The quiz competition was so competitive that two additional rounds had to be conducted to break the tie among the participants. Finally, the 1st, 2nd and the 3rd prizes were begged by Ms Kareena Saikia, NSS unit, College of Horticulture, Jorhat, Mr Biprajit Datta Choudhury, NSS unit, College of Agriculture, Jorhat and Mr Hassanul Bhuyan, NSS unit, Sarat Chandra Sinha College of Agriculture, Dhubri, respectively. The session ended with vote of thanks from Dr (Ms) Marami Dutta, Treasurer, Assam SCSI.





SCSI FOUNDATION DAY OBSERVED BY MEGHALAYA STATE CHAPTER

The Meghalaya Chapter observed 'Foundation Day' of the Soil Conservation Society of India on 24th September, 2020 in a befitting manner at village Mawphrew, Nongpoh with farmer friends.

Dr. Sanjay Swami, Professor (Soils) & Chairman of the SCSI-Meghalaya Chapter informed the gathering that the mandate of SCSI has more relevance in hilly regions like Meghalaya as the steep slopes of hills are highly susceptible to acute soil erosion problems due high intensity rainfall. The primitive cultivation practices like *jhum* and *bun* further enhances these degenerative trends and rampant deforestation, wild fires, extensive grazing, unscientific mining and quarrying, etc., are adversely affecting the overall ecological condition of the region. Control efforts have not succeeded to desired scale. He emphasized that soil conservation in hilly areas requires a well-planned and rational land use programme combined with engineering and cultural measures. Steep slopes may essentially be brought under permanent forests and gentle slopes should be terraced and valley bottom should be put under suitable agricultural crops. To achieve maximum benefit, it is essential to treat various areas on a complete watershed basis for rational use of forestry and agriculture, including horticulture. Conservation in hilly areas requires a proper land use programme combined with cultural and engineering measures.

He also appraised the participants about various activities taken up by the Meghalaya Chapter of SCSI for improving soil health in the hilly tract of Meghalaya.

Many members of SCSI- Meghalaya State Chapter participated in the programme. The programme ended with vote of thanks.

(Interaction with farmers during Foundation Day celebration)

FOUNDATION DAY CELEBRATION BY SCSI, HYDERABAD CHAPTER ON 24TH SEPTEMBER, 2020

Soil Conservation Society of India, Hyderabad Chapter, formed in Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad during year 2019 having the membership of multi-disciplinary subjects dealing with Soil and Water Conservation work in the State of Telangana. This Hyderabad chapter celebrates today on 24 September 2020, The Foundation Day of Soil Conservation Society of India, New Delhi. The society focuses mainly to protect the soil and water resources along with nutrients from the farmers fields by designing different soil and water conservation structures, conservation agriculture, forestry, agriculture economics etc. On this auspicious day Dr. V Praveen Rao Garu, Hon'ble Vice Chancellor, PJTSAU, Rajendranagar, Hyderabad was chief guest to grace the occasion and inaugurated the plantation by planting a tree program in the premises of farmers hostel, PJTSAU, Rajendranagar. Also board members of PJTSAU, Dr Manohar Rao, Dr Seema and Dr Farjan along with University officers and professors of Agriculture college also participated in the plantation program. The Hyderabad chapter Chairman, Dr. K Sreenivas Reddy, Principal Scientist (SWCE), ICAR- CRIDA, Dr. K Sadasiva Rao, Vice president of chapter & Dean, Faculty of Agricultural Engineering and Technology, Dr. G Manoj Kumar, Secretary of the chapter & Head, Department of Agricultural Engineering, Associate Dean, College of Agriculture, Rajendranagar have also participated in the plantation program.

PROMISING MULCHES IN POMEGRANATE

D.T.Meshram, Sr.Scientist
ICAR-National Research Center on Pomegranate, Solapur-413 255

Pomegranate is an important fruit crop of arid and semi-arid regions of India. Maharashtra, Karnataka, Madhya Pradesh, Gujarat and Andra Pradesh are the leading producers of pomegranate in India. In Maharashtra, pomegranate is predominantly cultivated in Solapur, Ahmednagar, Pune, Nasik, Sangli, Satara, Beed, Latur, Dhule, Nandurbar, Yevatmal, Wardha, Wasim and Osmanabad districts. As water is a scarce resource in most of the pomegranate growing regions of India, it should be judiciously used for optimum production. Mulching is an important agro-technique that helps to overcome the water shortage during summer months.

Mulching is the practice of covering the soil surface with any organic or inorganic materials for reducing the evaporation, conserving the soil, water and suffocating the weeds. Mulches are defensive layer of organic material that is spread upto7-10 cm depth like crop residues) or inorganic material like 100 micron thick-polyethylene Pervious/Weed mat placed on top of exposed soil below the plants. Mulches are useful in regulating microclimate conditions.

Types of mulches

Mulches are classified into 2 type's viz., Organic or inorganic.

S.No.	Particulars	Organic	Inorganic
1	Source material	Biotic in nature	Abiotic in nature
2	Decomposition	Easily decompose and release humic acid, nutrients, *etc* & increase organic matter content of soil. Are environmental friendly.	Do not decompose easily, hence may pollute the environment if not properly disposed.
3	Example	Straw, grass clippings, corn cobs, bark chips, leaves, wood ashes, sawdust, wheat straw, safflower waste, paddy straw, sugarcane baggasse	Pebbles, rocks, gravels, rubber and plastic sheets

Advantages: Mulches are advantageous in several ways and help in conservation of soil moisture through reduction of evaporation; Smothering of weeds; Controlling soil erosion; Improving beneficial soil micro flora; Locally available crop residue / organic waste material can be used as organic mulch without extra expenditure

How to Apply Mulch: In general mulch should be applied during crop regulation periods and only after rainy season. Though organic mulch can be applied in rainy season also but inorganic mulch should be removed during rainy season.

Organic mulch: Sugarcane bagasse is the fibrous dry pulpy residue left after the extraction of juice and is a by-product of sugar industry. It serves as an excellent mulch material for pomegranate. Plant the pomegranate saplings; install drip irrigation system along the beds. Select a circular area with 40-60cm diameter at base of pomegranate. Remove all the weeds at the base of plants. Apply sugarcane bagasse@3-4 kg/plant. Spread uniformly to 3-4" thick layer to block the sunlight.

Techniques for laying out of organic mulch

Techniques for laying out of inorganic mulch

Inorganic mulch: Select 1.5x1.0 m area at the base of plants; Remove all the weeds from the rectangular area; Make raised beds of 1.5x1.0 m size at the base of plants; Select pervious / weed mat of 1.5x1.0m (lxb) size, Place the pervious / weed mat on raised beds and fix the borders with soil, Should be removed in rainy season.

Do's and Don'ts for Applying Mulch-

Do's	Don'ts
Apply sugarcane baggasse mulch in a 6-10 cm layer around each tree after new leaf initiation period starts. Surround the trees with around40-60 cm of circle of sugarcane baggasse mulch or as far out as the lateral line.	Don't mound the sugarcane baggasse mulch against tree trunks. Keep sugarcane bagasse mulch 2.5-5.0 cm away from the crown of a plant. Mounding limits air circulation and creates excessive moisture, increasing the risk of disease and encouraging insect pests and rodents.

Water use and water use efficiency

Mulches reduced the rate of water loss through evaporation from soil surface. Organic mulch uses less water as compared to inorganic mulches. So, the soil water plant relationship is better in low irrigation regime than high irrigation regime that might help produce higher yield and thereby higher water use efficiency.

Critical plant stages for irrigation:

There are 4 critical stages for irrigation of pomegranate and the water requirement varies during different stages. The water requirement at different stages is given below.Critical Stages	No. of days	Water requirement (litres)		
		Sugarcane bag-gasse	Pervious/ weed mat	Without mulch
New Leaf Initiation	22-25	154-175	230-250	233-330
Fruit Development	70-80	1400-1600	1600-1800	1880-2340
Fruit Maturity	60-70	1620-1890	1750-1950	2151-2546
Fruit Harvesting	45-60	1800-2400	2000-3000	2620-3450
Total		4974-6065	5580-7000	6884-8667

Effect of organic and inorganic mulches on water use efficiency

Mulches	Water require-ment in (litres)	Number of fruits / plant	Average fruit weight(g)	Yield (kg/ plant)	Water con-served (%)	Water Use ef-ficiency (kgm^{-3})
Sugarcane baggasse	5519	65	290.50	18.88	30-35	2.20
Pervious/weed mad	6290	63	285.65	17.99	25-30	2.46
without mulch	7682	45	265.45	11.94	-	1.55

Economic benefits

The use of mulch has Benefit: Cost ratio of 3.14 to 3.17

Economics of pomegranate under mulching

Promising Mulches	Cost of cultivation/ha (Rs. In lakhs)	Gross production ($t.ha^{-1}$)	Total income ($Lakh.ha^{-1}$)	Net income ($Lakhha^{-1}$)	B:C Ratio
Sugarcane baggasse	2.87	13.97	9.04	6.16	3.14
Pervious orweed mad	3.61	13.31	11.46	7.85	3.17

Mulching is beneficial to the farmers for higher production and quality of fruits. Mulching techniques ensure increased crop yield, high water use efficiency, reduced water and energy consumption and minimal weed problems. It is recommended to use sugarcane baggasse or pervious mulches for better water use efficiency and maximum returns in pomegranate.

NATIONAL WEB- CONFERENCE ON

Management of Resources for Improvement of Productivity, Biodiversity and Livelihood Security (MRIPBLS-2020)

July 29-30, 2020

Organized by Uttar Pradesh State Chapter of SCSI & C.S.Azad University of Agriculture & Technology, Kanpur (UP)

RECOMMENDATIONS

Recommendations emerged from the deliberations made in the National Web-Conference on Management of Resources for Improvement of Productivity, Biodiversity and Livelihood Security held on July 29-30, 2020 organized by UP State Chapter of SCSI New Delhi and CSAUA&T, Kanpur. There are eight technical session were arranged in which one lead paper and 7-8 oral presentation were made and based on these deliberation the following Technical Recommendations were emerged out.

The details of Technical Session are as under-

T-I - Resource Management and Environment Sustainability
T-II - Soil and Water Management for Enhancing Productivity
T-III - Climate change impact on soil and water resources and mitigation strategies
T-IV - Utilization of renewable energy for sustainable soil and water management
T-V - Bio diversity conservation and climate change
T-VI- Doubling farmers' income through sustainable agriculture
T-VII- Doubling farmers income- Field experiences and livelihood Security
T-VIII- Crop Diversification & Value addition

Recommendations

The production system should be chosen in such a way that is based on its productivity, economic viability, sustainability and more importantly socio-cultural acceptability under different agro-climatic regions for making food and nutrition along with environmentally secured.

Improving bio diversity of agro-ecosystem such as landscape and wild life protection, soil protection and health including fertility, structure and function. Water cycle and quality, air quality etc. will eventually be improved.

Multiple cropping, intercropping and mixed cropping should be adopted as it provides benefits in terms of nutrient availability and pest control. For preserving the soil fertility, improving the environment, providing nutritious fodder and valuable timber, agro-forestry should be promoted through education and training.

Providing farmers with gene pool of traditional crop varieties for selecting suitable ones' to adapt in varied climatic conditions. Organic farming and use of bioagents should be used for inhibiting pathogens and to increase crop productivity.

The efficacy of post harvest system can be enhanced several fold by following hybrid approaches in combination to the technologies aimed at regulating vital physiological processes.

The income from the farm should be enhanced to attract youth to horticulture for sustainability in production by conserving natural resources. It is also imperative that some emerging horticultural technologies should be introduced which are simple, cost effective and remunerative.

For correct and judicious use of new technology, capacity building of the farming community (farmers, farm women, rural youth and extension personnel) regular training shall be organized under various promotional schemes.

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