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## SOIL SOLARIZATION: MODERN METHOD OF MANAGING SOIL-DISINFESTATION

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### INTRODUCTION

Prior to planting crops, solarization is a chemical-free method of removing pests from the soil, including pathogenic microorganisms (primarily fungi, bacteria, and nematodes), insects, and wild plants (Stapleton, 1986). It was first made available commercially in 1993, and today it is widely used because it is inexpensive, easy to detect, excellent chemical resistant, tough and flexible, odourless, and non-toxic, has a low water vapour transmission rate, and comes in thin to catch solar energy, place a trap in the ground, often with a clear polyethylene cover.

### SOLARIZATION

The soil undergoes physical, chemical, and biological changes as a result of this straight-forward technique's collection of solar radiant heat energy. This method involves covering the damp soil with clear polythene sheets while it is heated. Summertime temperatures rise to a point when numerous wheat seed-borne nematodes and soil-borne plant pathogens are killed. When compared to untreated soil, soil solarization would increase the soil's surface temperature by 10–12°C.



Figure 1: - An overview of Soil solarization in Agricultural field.

### Solarization and Soil Workability

Heavy soil is a phrase used to describe soils that contain clay, loam, or a combination of the two. They have a greater capacity for holding water than a light grain for an entire day, allowing steam to

be produced. Nematodes, weed seeds, and bug eggs need to be killed using steam in the soil. Sandy earth (light soil), which drains quickly and generates less steam, may make solarization less successful. Letting drip irrigation systems run underneath a transparent plastic cover and periodically adding water can optimise the solarization benefits in sandy soil.

### Factors for Soil Solarization

- Transparent (not black) polythene plastic should be used as this transmits most of the solar radiation.
- Solarization should be carried out during periods of high temperature and intense solar radiation.
- The thinnest plastic possible should be used as it is both cheaper and somewhat more effective in heating.
- The plastic sheeting should be kept in place for as long as possible.

### Principles

The best time for soil mulching, when climatic conditions are most favourable, can be determined experimentally by tarping the soil and measuring the temperatures. Meteorological data from previous years and predictive models further aid in this task. Adequate soil moisture during soil solarization is crucial to increase the thermal sensitivity of target organisms, improve heat conduction in the soil and enable biological activity during solarization. The soil can be moistened by single irrigation shortly before tarping. Additional irrigation during solarization via drip system or furrow irrigation is usually not necessary except for very light soils; in addition to which it may reduce soil temperatures unless carried out during the night. Solar radiation heats the soil through repeated daily cycles. At increasing soil depths, maximal diurnal temperatures decrease, are reached later in a day, and are maintained for longer periods. The soil is mulched with thin, transparent polythene sheets or other plastic material. Another method of solarization involves a closed glasshouse (or plastic house), provided climatic conditions are suitable and the soil is kept wet. Novel technologies such as the use of sprayable plastics can replace plastic mulching of the soil.

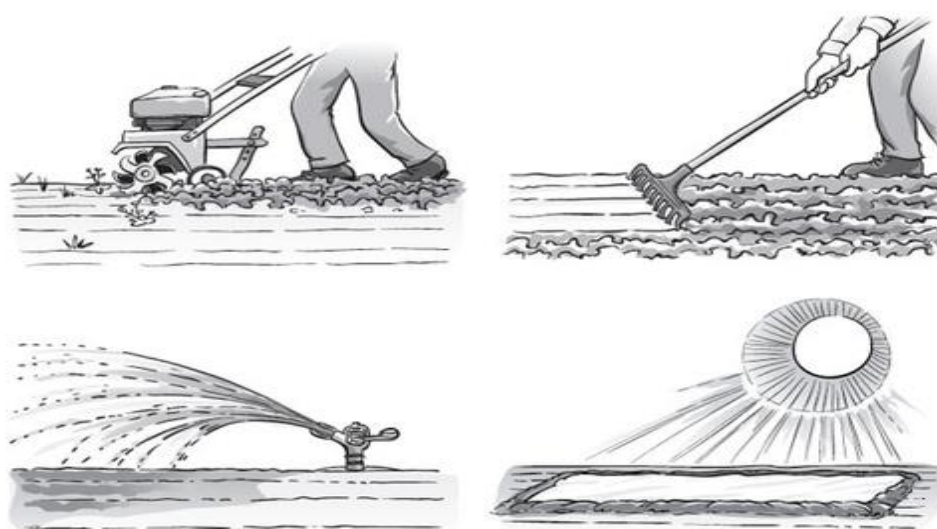


Figure 2: - Basic steps to soil solarization diametrically.

Successful pathogen control in various regions of the world is usually obtained within 20-60 days of solarization. Extending the solarization period enables control in deeper soil layers as well as of pathogens that are less sensitive to heat. Proper preparation of soil ready for planting is essential. This is the case because after plastic removal the principal should be disturbed as little as possible; to avoid recontamination. Solarization causes chemical, physical, and biological changes in the soil that affect pest control, plant growth, and yield.

### PROCEDURE

#### [A] Site Selection and Preparation

- Solarization can be applied to entire areas (garden) or too linear rows (beds) that will be cropped using plasticated techniques. Shady areas should be avoided temperatures likely will not reach lethal levels the area to be treated should be well trained and free of clouds and crop debris. Tillage is best applied with the rototiller but hand speeding and tracking are also effective because wet soil conducts heat better than dry soil should be thoroughly watered to the depth of 12 inches this can be done before or after the film is applied. Soaker Hose and irrigation Installed under the film can be used to irrigate the soil after application of the film is complete water then can be added if needed during the solarization.

#### [B] Film Selection and Application

Clear polythene film of various thicknesses (0.5-4 mm) should be used. These can be obtained from home improvement stores hardware stores garden centres for in bulk rolls from agricultural suppliers. Agricultural films for commercial application or often treated with ultraviolet (UV) inhibitors to delete film background breakdown. Coloured films should not be used for solarization because they do not transmit solar radiation but rather reflect or absorb it diminishing soil heating fine point (0.5 to 1mm) films conduct more heat, but are more susceptible to tearing and have a shorter life than thicker films. The film should be applied as tightly as possible to the soil surface to minimize air gaps and potential damage from wind.

- The film should be finally and called by breaking the edges in trenches dug by hand when treating gardens and small plots or during bed shaping and film application when using plastic culture. In the treatment of linear rows (beds) using plastic culture beds are formed and the film and drip tape are applied simultaneously.



Figure 2: -Soil solarization with plastic sheets in greenhouse.

**Advance Approach**

India is a country of 28 states and consist of humid and arid climatic condition in most of the states. As this is realisation technique can easily be used in those areas where there is hot and arid climates and have direct contact of sunlight. For advancement of this technique research is going on.

An Article THE ROLE OF SOIL SOLARIZATION IN INDIA: HOW AN UNNOTICED PRACTICE COULD SUPPORT PEST CONTROL was published on Sept, 2017 in which it is mentioned that trials were conducted in 15 states of India to launch this soil sterilization as an approach to overcome conventional treatment that is chemical usage in plants. As these chemicals have made a huge agricultural pollution and drawing the originality of soil properties. Apart from that the plastic we use for keeping smile is made of polythene which is also harmful for environment so to overcome these biodegradable plastics were suggested.

**Applicability and Benefits**

It is a nonchemical method with less drastic effects on the biotic and abiotic components of the soil it is simple and is therefore suitable for both developing and developed countries and it is frequently less expensive than chemical soil disinfection. Unlike the other method of weed management, soil solarization brings about control of a wide variety of weeds and pest including soil-borne bacteria nematodes, and enhance the availability of mineral nutrient to crop plants.

**Constraints and Limitation**

Major constant in soil solarization is the high cost of polythene films. In many parts of India land is also left fallow during summer so their scope for utilizing soil solarization as weed management method without any adverse effect on succeeding crops. The limitation of this method stem from its dependence on climate and it can therefore be used only in certain climatic regions and during limited periods of the year. In addition, during solarization, the soil remains without a crop for several weeks nevertheless this method has attracted many researchers in more than 60 countries and it is used by farmers especially in combination with other methods.

**Conclusion**

It is user-friendly, non-hazardous, environmentally safe, and effective for more than one growing season or a year. Soil solarization is an effective, alternative, and novel tool for weed management and soil management other than chemical solarization repeated for two consecutive years can considerably enhance the effect of crop yield, weed control, and improve the soil quality.

**References**

- Cohen, O., & Rubin, B. (2007). 11 Soil Solarization and Weed Management. *Non-Chemical Weed Management*, 177.
- D'Addabbo, T., Miccolis, V., Basile, M., & Candido, V. (2010). Soil solarization and sustainable agriculture. In *Sociology, Organic Farming. Climate Change and Soil Science* (pp. 217-274). Springer, Dordrecht.
- Katan, J., & DeVay, J. E. (1991). *Soil solarization*. CRC Press.
- Stapleton, J. J., & DeVay, J. E. (1986). Soil solarization: a non-chemical approach for management of plant pathogens and pests. *Crop protection*, 5(3), 190-198.

## **BENEFITS OF DRIED FISH FOR HUMAN HEALTH**

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### **Abstract**

For the health and welfare of the growing human population, it is essential that the supply of dried fish matches the demand for nutrients. An additional corrective action to precisely define the quantity and quality of nutrients delivered by dried fish is suggested by the diminishing fisheries resources. High-quality proteins, healthy fats, including long-chain omega-3 fatty acids like eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and a special source of key elements like Iodine, Zinc, Copper, Selenium, and Calcium are all increasingly being provided by dry fish.

### **Introduction**

Fish is a nutritious source of food and a high-quality protein that is frequently more affordable than other meat. Fish must be processed and preserved in order to ensure the quality because fish and fish products are perishable without any preservatives or processing procedures. Postharvest losses have a negative impact on fishing communities whose livelihood and status depend on post-harvest activities on a regular basis. Such losses also have a negative impact on the fishing communities' finances and reduce the amount of protein that is readily available to a large percentage of the population. This article provides information on dry fish as a contributor to food and nutritional security, then analyses its availability and barriers to increasing consumption, and finally suggests potential interventions in order to maximize the contribution of dry fish to diets, particularly those of the poor. Dried fish is collective term used for fish that has been preserved using drying method. Drying method is a food preservation method that involves removing water from the food, which reduces the growth of microorganisms in it. The fish is usually air dried, sun dried, or by smoking or freezing. This article will provide you with the nutritional value and health benefits of dried fish. There are different types of dried fish in many parts of the world. The dried fish and seafood industry in India grew at a positive compound annual growth rate (CAGR) of 6.71% from 2013 to 2018, with a sales value of INR 96.61 million in 2018, a 5.49% rise over 2017. The market had its best year in 2015, when it gained by 9.48% over the previous year, and its worst year in 2016, when it increased by 5.12% over 2015.

### **Fish as a nutritious food**

The oceans, lakes, and rivers regularly yield roughly 179 million tonnes of fish, making it the most extractive use of wildlife and a major source of employment for many people. For 20% of all animal protein intake, practically 3.1 billion individuals rely upon fish. Worldwide fish utilization has expanded from 9 kg per capita in 1961 to roughly 20 kg per capita today. Dried fish is a notable source of amino acids, macro minerals (Sodium, Calcium, Potassium, Magnesium, Phosphorus), micro minerals (Iron, Zinc, Copper, Manganese, Selenium, etc.), and Vitamins. It is a reasonable supply of proteins and good fats (long-chain omega-3 unsaturated fats).

The nutrient composition of fish varies across species, especially for micronutrients. Iron content ranged from 0.34 to 19 mg/100 g raw edible parts; zinc from 0.6 to 4.7 mg/100 g; calcium from 8.6



to 1900 mg/100 g; vitamin A from 0 to 2503 µg retinol activity equivalent/100 g; and vitamin B12 from 0.50 to 14 µg/100 g.

### **Dry fish as a contributor to food and nutritional security**

Drying is the procedure where the moisture content in the fish is decreased to suitable required qualities under controlled clean conditions. Ancient civilizations practised fish drying, and some of the traditional methods are still in use today. A widely used conventional method for fish preservation is sun drying. By doing this, decreasing the water content of the fish, so preventing the passage of microorganisms. The majority of cured fish products are produced in Asia, China, Japan, Indonesia, Philippines, India, and Korea. Additionally, a significant portion of the fish consumed in Africa is sold dry or dried and smoked.

### **Methods of fish drying**

For the drying of fishes mostly three types of methods are used (a) osmotic hydration, (b) thermal drying, and (c) mechanical de-watering.

### **Nutritional Value of Dried Fish**

Dried fish is high in protein, iodine, antioxidants, and omega-3 fatty acids. It is also rich in vitamin D and low in calories.

#### **1. Contains healthy fat**

Dried fish is a good source of omega-3 fatty acids. These are the healthy fats that are essential for our body. They are considered the “good fats”, unlike the bad saturated fats in meat. Omega-3 fatty acids offer many health benefits, including reducing inflammation, improving heart health, and boosting brain health.



#### **2. Good for the heart**

Dried fish contains healthy fats, omega-3s, and nutrients that are good for the heart. These nutrients help to keep the heart functioning properly and reduce the risk of heart disease. Omega-3s are especially beneficial for the heart and have been shown to lower cholesterol levels, blood pressure, and triglyceride levels. They can also reduce the risk of arrhythmias (irregular heartbeats) and help to prevent strokes.



### 3. Great source of vitamin D

Dried fish is a great source of vitamin D. Vitamin D is important for maintaining strong bones and teeth, and it also helps the body absorb calcium. Vitamin D has been shown to play a role in reducing the risk of several diseases, including cancer and heart disease. Getting enough vitamin D is especially important for people who are at risk for osteoporosis.



### 4. Supports healthy brain

Dried fish is a good source of omega-3 fatty acids, which are important for maintaining brain health. These fats can help protect the brain against damage and improve cognitive function. Omega-3s have been shown to improve memory power, learning, and reaction time. They may also help reduce inflammation in the brain, which has been linked to Alzheimer's disease and other neurological conditions.



### 5. May prevent depression

Depression is a serious mental illness that can negatively affect how you feel, think, and behave. It can lead to a variety of emotional and physical problems and can decrease your ability to function at work or home. Dried fish is a great source of omega-3 fatty acids, which are essential nutrients that play an important role in brain health. Omega-3 fatty acids are known to help reduce inflammation and protect the brain from damage.

Studies have shown that people who consume high amounts of fish and omega-3 fatty acids are less likely to suffer from depression. In one study, people who consumed the most omega-3 fatty acids had a 22% lower risk of developing depression than those who consumed the least.

### 6. Reduce inflammation

Dried fish is a great source of omega-3 fatty acids, which are known to reduce inflammation. In fact, a recent study showed that people who consume omega-3 fatty acids have a lower risk of developing inflammatory diseases such as arthritis and Crohn's disease. The anti-inflammatory properties of omega-3 fatty acids may also help to reduce the symptoms of existing inflammatory conditions. If you suffer from any type of inflammatory condition, including asthma, eczema, or psoriasis, consider adding dried fish to your diet.

## 7. Good for weight loss

Yet another impressive health benefit of dry fish is that it is great for weight loss. There are about 300 calories in 100 grams of dried fish. Dried fish is a great source of protein and other nutrients, making it an ideal food for people who are trying to lose weight. In addition, dried fish is low in calories and fat, making it a healthy option for those who are watching their weight.



## 8. Composition level

Protein is a key source of antibodies and enzymes for all living beings, and makes up an essential part of muscles, hair and other bodily components. Dried fish provides an excellent source of protein with fewer calories than other foods such as beef. One hundred grams of dried fish contains about 80 percent protein with 300 calories, while beef has more than twice the calories with far less protein. This profile makes dried catfish a compelling purchase for those looking to increase their intake of healthy food and provides a distinct advantage to dried-fish retailers.

## References

Siddhnath, Ranjan, A., Mohanty, B.P., Saklani, P., Dora, K.C. and Chowdhury, S., 2022. Dry fish and its contribution towards food and nutritional security. *Food Reviews International*, 38(4), pp.508-536.

<https://healthguide.ng/health-benefits-of-dried-fish/>

## ACTIVE PACKAGING OF FOOD PRODUCTS

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### Abstract

The growing population and receding land resources necessitate the use of produce to maximum extent and it is here that packaging plays an important role in enhancing the shelf life of food products through the supply chain. The improvements in packaging has led to the availability of a number of products yearlong across various parts of the world. Packaging is defined as enclosing food to protect it from tampering or contamination from physical, chemical and biological sources. Packaging maintains the benefits of food processing after the process is complete, enabling foods to travel safely for long distances from their point of origin and still be wholesome at the time of consumption. Packaging separates the products from the external environment and has in general four basic functions: protection, communication, convenience, and containment. Active packaging is used successfully to increase the shelf life of processed foods and meet consumer demands in terms of providing high-quality products that are also fresh and safe.

### Active Packaging

Active packaging is an innovative approach to enhance the shelf-life of food stuffs while improving their quality, safety and integrity. It can be defined as a packaging system that interacts with the package components and the food to extend the shelf-life or to improve the safety or sensory properties of the food as well as quality of the packaged product. Active packaging systems can be classified into active scavenging systems (absorbers), which remove undesired compounds from the food or its environment or active-releasing systems (emitters) which add compounds to the packaged food or into the headspace.

### Active scavenging systems (absorber)

#### Moisture Absorbers

Moisture absorbers (sachets, pads, sheets or blankets) are used for packaging dried foods that include desiccants like silica gel, calcium oxide, activated clays and minerals as they are tear resistant in permeable plastic sachets. Apart from moisture absorber sachets for humidity control in packaged dried foods, moisture drip absorbent pads, sheets and blankets for water control are used in high water activity foods such as fish, poultry, fruit and vegetables. They consist of two layers, a micro porous nonwoven plastic film like polyethylene or polypropylene between which a superabsorbent polymer (Polyacrylate salts, CMC and starch copolymers) is placed that is capable of absorbing up to 500 times its own weight. Moisture drip absorber pads are placed under packaged fresh meats, fish and poultry to absorb unsighted tissue drip exudates. Larger sheets and blankets are used for absorption of melted ice from chilled seafood during air freight transportation. In fig.1 moisture absorbers has shown that it increases the shelf life of product and its individual sachet is used for packaging cans and glass bottles.

### Ethylene scavengers

Different mechanisms has been adopted to reduce or eliminate ethylene from packages and thus delay the ripening process to extent the shelf life of fruit. Currently polymeric matrix is introduced into the packaging material or they can be applied as a coating (dispersion). Ethylene scavenger increases the shelf life of banana and it is represented in fig.2



Fig.1

Fig.2

### Oxygen Scavengers

Oxygen scavenging systems included the use of self-adhesive labels or loose sachets in the packaging containers along with food. Oxygen scavenging compounds react with oxygen to reduce its concentration inside the package. Ferrous oxide is the most widely used scavenger. Non-metallic oxygen scavengers (ascorbic acid) has been developed to eliminate the potential for metallic tints being imparted to food products. The presence of mixed enzymes such as glucose oxidase and catalase also scavenge oxygen in food. Glucose oxidase is a potential enzyme for oxygen-adsorbing processes where it catalyzes the oxidation of glucose to gluconic acid and  $H_2O_2$  which is further degraded by catalase to water and oxygen.

Type of Food Package	Food Product	Properties
<b>Moisture Scavenger</b>	Mushrooms, tomatoes, strawberries, maize, grains, seeds, fresh fish and meat	Extension of shelf life through maintaining moisture content, decrease in moisture condensation in the packaging, positive impact on the appearance, reduction in browning or discoloration.
<b>Ethylene Scavenger</b>	Climacteric fruits and vegetables	Reduction in ripening and senescence, therapy enhancing quality and prolonging shelf-life.
<b>Oxygen Scavenger</b>	Cooked meat products. Grated cheese, bakery products. Fruit and vegetable juices. Seeds, nuts and oils; fat-containing instant powders, fried snacks; dried meat products	Prevention of discoloration. Prevention of mold growth. Retention of vitamin C content, prevention of browning. Prevention of rancidity

### Active releasing systems (emitter)

**Carbon dioxide emitter**

Carbon dioxide (CO<sub>2</sub>) is formed in some foods due to spoilage and respiratory reactions. This CO<sub>2</sub> must be removed from the packaging to prevent the product from spoiling and the packaging from damage. For example, roasted coffee can contain 15 atm of dissolved CO<sub>2</sub> due to the Strecker decomposition reaction taking place between sugars and amines. In such a case, CO<sub>2</sub> scavengers can be of use. O<sub>2</sub> and CO<sub>2</sub> scavenging bags are used to delay flavor changes due to oxidation and to absorb CO<sub>2</sub>. In some plastic films, CO<sub>2</sub> permeability is 3 to 5 times higher than oxygen permeability. In such cases, CO<sub>2</sub> must be produced continuously to maintain the desired concentration in the packaging. For this purpose, CO<sub>2</sub> producing systems are used in the packaging of products such as fresh meat, poultry, fish and cheese. In some food products where the volume and appearance of the packaging is critical, O<sub>2</sub> scavengers and CO<sub>2</sub> emitters are used together to prevent the packaging to collapse due to O<sub>2</sub> absorption.

**Antioxidant releaser**

Significant interest has also been placed on antioxidant agents because of their capability to increase the stability of oxidation-sensitive food products. Oxidative degradation is the major cause of food spoilage after microbial growth. Oxidative reactions are responsible for reducing the nutritional value of food affected by the degradation of essential fatty acids, proteins and lipid soluble vitamins, producing off-flavours, odors, and colour change due to pigment degradation. There are studies focusing on the inclusion of antioxidant agents in packaging and on natural antioxidants currently applied in active food packaging. In addition, edible and active films and coatings (chitosan, cellulose derivatives, gelatin, galactomannans, alginate,) are used as carriers of natural antioxidants for lipid foods. The advantage of enclosing antioxidants within the packaging material surpasses the beneficial of their direct inclusion in food formulations. So, most of the antioxidant systems are manufactured in the form of sachets, pads or labels, or incorporated into the packaging monolayer or multilayer materials.

**Aroma releasers**

The addition of pleasant aroma compounds can mask unpleasant and bothering odors and avoid flavor scalping by modifying the equilibrium conditions and helps in improvement in the consumer appeal of the food products. However, currently most aroma emitting products are applied in plastic products for non-food applications. But in India use of this technique is negligible because of its high cost.

Type of Food Package	Food Product	Properties
Carbon dioxide emitter	Fresh fish and meal	Extension of microbiological shelf life, reduction in head space volume of modified atmosphere packaging
Antioxidant releaser	Fresh fatty fish and meat; fat-containing instant powders; seeds, nuts and oils; fried products	Improvement of oxidative stability
Antimicrobial packaging systems	Fresh and processed meat, fresh and smoked fish, fresh seafood, dairy products, fresh and processed fruits and vegetables, grain, cereals and bakery products, ready-to-eat meals	Inhibition or retardation of bacterial growth, extension of the shelf-life

**Antimicrobial packaging systems**

There is increasing interest in the use of packaging materials containing antimicrobial substances due to increasing sensitivity towards health. Consumers demand minimally processed, preservative-free food products with longer shelf-life. Packaging materials, edible films and coatings can be reinforced with antimicrobials to form a protective barrier to prevent and delay such microbial growth. Packaging materials serve as carriers of antimicrobials that are effectively released into the food to extend the shelf-life, and improve the quality and safety of the food. This allows packaging to provide an additional and final barrier to prevent the growth of foodborne pathogens. In addition, most natural antimicrobial agents are biodegradable and easily decompose. Antimicrobial packaging can be produced by incorporating antimicrobial substances directly in packaging films, coating packaging films with these antimicrobial substances and producing packaging materials made from polymers. In general, antimicrobial packaging systems can either migrate or not migrate into the food based on their interaction with the antimicrobial substance used and with the packaging and food matrix. Antimicrobial packaging has been proven to improve the shelf-life, safety and quality of many food products due to its potential to reduce or minimize microbial growth in food.

**1. Non-biodegradable packaging**

Polymeric packaging materials from nylon, synthetic polymers, LDPE, HDPE and polystyrene do not undergo degradation into fragments by microorganisms. In spite of the low permeability of packaging materials (polypropylene and polystyrene), they are effective in packaging probiotic cheeses with long shelf life.

**2. Biodegradable packaging**

The edible coating and films from proteins (wheat gluten, collagen, gelatin, soya, casein and whey proteins used as film forming polymers), lipids (beeswax, acylglycerols and fatty acids), starch, chitosan, polylactic acid and polyhydroxy butyrate undergo degradation into low mol. weight fragments by the action of naturally occurring microorganism such as bacteria, fungi and algae. These are then converted into coating and are applied to fruits and vegetable. Chitosan is mostly used edible coating in India.

**Conclusion**

The growing awareness among consumers is causing reluctance for use of chemical conservatives as many of them are suspected carcinogens with residual toxicity resulting in increased pressure for adoption of more “natural” alternatives for increasing shelf life of foods. These include the use of natural antimicrobials derived from plant extracts like essential oils can be used as alternatives to chemical additives. Consumer demands for meat and other food products with premium qualities like adequate shelf life, safety, convenience and information is driving for development of active packaging. Reduction in packaging material costs can occur if sales volume grows along with emergence of newer and cheaper technologies. Now India is the most populated country in the world and also India is the second largest producer of food and vegetable in the world so Active packaging can revolutionaries the food packaging industry with stable food products reaching to consumers.

## A NEW ERA OF REMOTE SENSING IN INDIAN AGRICULTURE

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### Abstract

Remote sensing is a type of technology that accumulates data about the planet by using instruments on satellites revolving the Earth. Agriculture offers essential resources such as fuel, fiber, and sustenance to humanity. This position must be performed in the setting of climate change and environmental sustainability, as well as a rising population, while preserving the viability of farming livelihood activities. The use of remote sensing in agriculture can aid in the creation of agricultural methods to meet various kinds of challenges by giving information on crop status at various scales throughout the season. Remote sensing data has been utilized extensively in India for land cover mapping, identifying and mapping of plant types, disruptions (fire, insects, crops), agriculture, forestry, productivity and rangeland surveys, ecological application, and ecosystem management.

### Introduction

Agriculture is the backbone of every business on the globe. Food production in adequate amount and quality is critical to the population's well-being. Agriculture is one of the most significant areas of the Indian economy. As the world's greatest suppliers of rice, wheat, and legumes, India has to keep up with developing technology. Remote sensing and GIS have expanded rapidly in many sectors for mapping, and surveillance, administration, as well as potential improvement over the last few decades. Farmers today depend on advancements in technology.

Both nutrients and water are essential for agricultural crops to develop, and they are susceptible to severe weather events, diseases, and insects. In such a case, remote sensing (RS) can provide valuable information to assist in crop recognition and surveillance. When this data is combined with other kinds of data in a geographic information system, or GIS, it becomes an essential instrument in assisting farmers in making agricultural and farming strategy choices. India's leading weather risk management company, utilizes remote sensing and geographic information system (GIS) technologies for real-time weather analysis and forecasting, in addition to observing crops that have been cultivated, destroyed or harmed due to flooding and rainfall.

**Keywords :** Remote sensing (RS), Geographic Information System (GIS), Advantages, Disadvantages

**Collecting Remote-sensing Information:** Ground-based sensors, aircraft, UAVs (Unmanned Aerial Vehicles), and space-based (satellite) sensors are all able to be utilized to collect remote sensing images. This are mainly:

### Ground-based Sensors

Crop Scan, Green seeker, and other handheld non-imaging sensors have been utilized to identify reflective characteristics for a range of issues.

Sensors installed on a vehicle, for example, are used for real-time ranging rate fertilizer/herbicide



applications.

### **Aerial Sensors**

Air monitors can be installed on human-operated and autonomous aircraft. The primary benefits of airborne devices are that high-resolution pictures can be obtained rapidly and the data can be used to solve a wide range of issues.

### **Space-based**

Sensors There are various sensor and satellite alternatives readily available. In general, each sensor acquires data at various wavelengths and resolutions, and each satellite has a varied revisit period. Panchromatic (black and white or panoramic band) spatial resolution is usually greater than multispectral (multi) spatial resolution. The spatial resolution of a picture is the size of each pixel.

### **Remote Sensing Applications in Agriculture**

Application of remote sensing in quantifying the crop health status is trending. There are multiple applications of RS in agriculture:

#### **A. Remote Sensing Applications in Agriculture – Crop Productivity Management**

1. Crop production predictions
2. Crop identification
3. Evaluation of agricultural development and crop damage
4. Horticulture and agricultural system analysis

#### **B. Remote Sensing Applications in Agriculture – Crop Water Management**

1. Management and monitoring of irrigation system
2. Drought vigilance
3. Mapping of water resource
4. Weather data collection
5. Flood mapping and surveillance
6. Crop evapo-transpiration

#### **C. Remote Sensing Applications in Agriculture – Soil Characteristics**

1. Soil moisture assessment
2. Soil mapping & Land mapping
3. Nitrogen management

### **Remote Sensing Applications in Agriculture – Crop Analysis & Forecasting**

1. Crop yield estimation
2. Establishing the planting and harvesting dates
3. Detection of stress and evaluation of crop condition
4. Pest and disease identification
5. Precision agriculture
6. Climate Change Monitoring and Forecasting
7. Atmospheric dynamics

### **UAV cameras**

In the future, spectral, spatial, and temporal resolution instruments will be enhanced, allowing for an increase in the number of soil and plant factors and vegetation stressors, including soil contaminants, that can be documented to improve stress forecasts.

Sensors range	Applications
<b>Visible</b>	<ul style="list-style-type: none"> <li>• Aerial mapping and images</li> <li>• Photo-grammetry and 3D reconstruction</li> <li>• Surveying and land application use</li> <li>• Plant counting</li> </ul>
<b>Multispectral</b>	<ul style="list-style-type: none"> <li>• Plant health monitoring</li> <li>• Vegetation index calculation</li> <li>• Water quality assessment</li> <li>• Plant counting</li> </ul>
<b>Hyperspectral</b>	<ul style="list-style-type: none"> <li>• Plant height monitoring</li> <li>• Vegetation index calculation</li> <li>• Water quality assessment</li> <li>• Spectral index development</li> <li>• Mineral mapping</li> </ul>

Advantages and disadvantages of Remote Sensing:

#### Various platforms for remote-sensing data collection.

Platform	Advantages	Disadvantages
<b>Hand or ground</b>	<ul style="list-style-type: none"> <li>• Can be used to determine the reflectance properties of a single leaf, plant, or region.</li> <li>• Availability that is adaptable.</li> <li>• Effective for real-time spraying applications.</li> </ul>	<ul style="list-style-type: none"> <li>• Collect the reflectance characteristic from a single point, not creating the image</li> </ul>
<b>Satellite</b>	<ul style="list-style-type: none"> <li>• Some free images.</li> <li>• Clear and stable images.</li> <li>• A large area within each image.</li> <li>• Good historical data.</li> </ul>	<ul style="list-style-type: none"> <li>• High cost for high spatial resolution images.</li> <li>• Clouds may hide ground features.</li> <li>• Fixed schedule.</li> <li>• Data may not be collected at critical times.</li> </ul>
<b>Aircraft</b>	<ul style="list-style-type: none"> <li>• Relatively flexible availability.</li> <li>• Relatively high spatial resolution.</li> <li>• Changeable sensors.</li> </ul>	<ul style="list-style-type: none"> <li>• High cost.</li> <li>• Availability depends on weather conditions.</li> </ul>
<b>UAV(Unmanned Aerial Vehicle),</b>	<ul style="list-style-type: none"> <li>• Flexible availability.</li> <li>• Relatively low cost.</li> <li>• Very high spatial resolution.</li> <li>• Changeable sensors</li> </ul>	<ul style="list-style-type: none"> <li>• Image blurring can occur on unsteady systems.</li> <li>• Geographic deformation.</li> <li>• Operation may need certification.</li> <li>• Height above ground may be restricted.</li> </ul>

Sensors	Advantages	Disadvantages
<b>Proximal sensors</b>	<ul style="list-style-type: none"> <li>• Economical</li> <li>• High accurate</li> <li>• High spectral resolution</li> </ul>	<ul style="list-style-type: none"> <li>• Time-consuming</li> <li>• Labor-intensive</li> <li>• Low temporal resolution</li> <li>• Unsuitable for big regions</li> </ul>
<b>UAVs</b>	<ul style="list-style-type: none"> <li>• Easy to carry</li> <li>• High spectral resolution</li> <li>• Short revisit-time</li> <li>• The flexibility of camera selection</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive operational expenses</li> <li>• Prolonged turnaround times</li> <li>• Surveying tiny regions</li> <li>• Security issues</li> </ul>
<b>Airborne sensors</b>	<ul style="list-style-type: none"> <li>• High spatial resolution</li> <li>• High spectral resolution</li> <li>• Sensor operation versatility</li> </ul>	<ul style="list-style-type: none"> <li>• High operational expenses</li> <li>• Long turnaround times</li> <li>• Inadequate temporal resolution</li> </ul>
<b>Space-borne sensors</b>	<ul style="list-style-type: none"> <li>• Economical</li> <li>• Frequent return visits</li> <li>• Large data archives</li> <li>• Capable of large-scale monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Low spectral resolution</li> <li>• Sensitivity to weather conditions</li> <li>• Atmospheric attenuation</li> </ul>

### Conclusion

With recent population growth, the proper utilization of land resources for food agriculture has grown increasingly important, and remote sensing provides an effective method for field tracking. Farmers find it difficult to keep up with changing market needs and changes within the current setup. Farmers will be more flexible and adaptive to market fluctuations as a result of the new agricultural planning approach. The current progress in high resolution field level image processing achieved by drones combined with satellite-derived knowledge is highly promising. Though remote sensing applications have many theoretical considerations and backgrounds, they have a large potential in agricultural sciences to assist mankind with improved output, vulnerability prediction, and effect assessment in the context of fast climate change.

### References

- Gholizadeh, Asa. (2019). Detecting Vegetation Stress as a Soil Contamination Proxy: A Review of Optical Proximal and Remote Sensing Techniques. *International Journal of Environmental Science and Technology*. 16. 2511-2524.
- Navalgund, Ranganath & V, Jayaraman & Roy, Parth. (2007). Remote sensing applications: An overview. *Current science*. Vol. 93.

## **AGROCHEMICALS: THE HARMFUL POLLUTANT FOR OUR LIVING EARTH**

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### **Abstract**

Agrochemicals are a serious hazard to the environment. Their harmful effects due to excessive use can not be neglected. Agrochemicals not only pollute the environment but also hampers the life of the agricultural land entering into the food chains affecting the soil, water, air, plants, animal health, microbial health and human health. Exposure to these fatal chemicals causes health effects in humans. The most common is cancer and nervous system damage. The disproportionate use of these chemicals contaminate the groundwater with nitrate, a chemical compound which is poisonous to humans and animals when in large concentrations. The residues of the chemicals in the soil causes nutrient imbalance death of many beneficial organisms in the soil and hence causes quality reduction in agricultural produce.

**Keywords :** Agrochemicals, food chain, contamination, nutrient imbalance

### **Introduction**

Modern agriculture basically relies on the extensive use of Agrochemicals. With the burgeoning growth of the population along with the agricultural sector, there has also been a rise in chemical use. India has become one of the leading producers of agrochemicals in the world as pesticides and fertilizers are widely used in agriculture in order to meet the food demands of the growing population. In the pursuit of higher productivity we have forsaken our mother Earth for our own selfish motives by ignoring the fact that only if our environment and its elements will be safe then only we will be safe and healthy. The use of Agrochemicals is becoming one of the serious issues in not only India but all over the world. This issue can be solved by realizing the fact that overuse is not the solution but by judicious use and sustainability through changes in the practices of agriculture.

### **Effects on Living Earth**

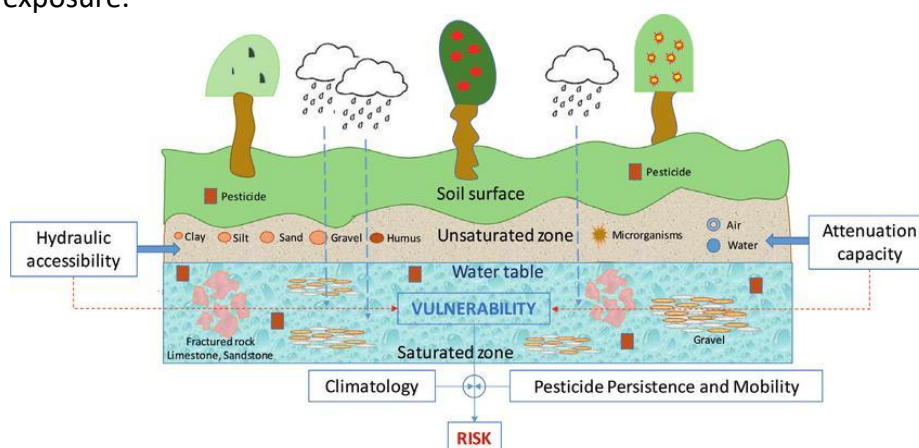
Agrochemicals also known as agricultural chemicals are used to facilitate the growth and protection of the plants. The only motive to use these chemicals was "Production and Protection" but their overuse has now become a threat to the environment. The impacts of the these chemicals can not be ignored as these are toxic and when stored in large quantities may cause environmental risks particularly during accidental spills. The harmful chemicals such as the most common Dichlorodiphenyltrichloroethane (DDT)- used as an insecticide and can persist in soil for more than 10 years, Chlordane- an insecticide to kill specific insects such as termites, grasshoppers etc.), Endosulfan - used as a pesticide and also as wood preservative, Aldrin - used as an insecticide and some others are Endrin, Dioxins, Dieldrin, etc.

The pollutants affect the soil and microbial, water, air, human health, etc. Lets know their effect in brief.

- 1. Effect on soil and microbial health-** Improper and imbalanced application of agrochemicals (i.e insecticides, pesticides, weedicides etc) lead to the environmental degradation and deteriorate the soil. An ideal pesticide kills the target pest and does not leach down to the groundwater but unfortunately, this is a rare case in modern agriculture. The continuous and the overuse of these chemicals has caused the accumulation of their residues in the soil which further leads

to soil and food chain contamination, nutrient imbalance, lost biodiversity in the soil, making the nitrogen less available to plants (nitrogen is important for plant growth). Microorganisms such as bacteria help to create nitrogen in the soil but most of the agrochemicals that are used on the plants spill from plants to the soil affecting the population of the bacteria which eventually affects the level of Nitrogen in soil. The Fungicides and their toxic elements left after application adversely affect many biochemical processes which are linked to enzymatic activities.

- Effect on air-** Agrochemicals are released in air during spraying. These chemicals then get mixed with the air and affect animals, birds, pollinators etc as they get inhaled by the animals in the surrounding and also get absorbed through their skin causing serious health problems. These pesticides then also get inhaled by the humans which causes irritation and allergies to eyes, nose and throat. The crop productivity in many plants gets reduced as the pollinators such as bees, some beetles and fruit flies get affected by the exposure of pesticides. These agrochemical particles which are suspended in the air are carried to other areas by wind eventually contaminating those areas too.
- Effect on water-** The residues of the agrochemicals such as pesticide can drift into water bodies by washing the equipments used for spraying, wind, rain runoff and air. The excessive use of these chemicals leads to the contamination of groundwater carrying nitrate which is poisonous when present in large quantities or concentration. The fish mortality is one of the problems caused by the water contaminated by pesticides also causing problem for the livestock and poultry. As fishes are an important part of marine ecosystem, they play a crucial role in food chain as they are eaten by many mammals, birds and are also a part of human meals. So these chemicals are a threat to all of the living bodies whether in land, water or the air.
- Effect on humans-** There are different types of pesticides that affect the particular part of the body or say the harmful effects of the agrochemicals depend on their types. Some are carbamates and organophosphates which affect the nervous system, some others affect the skin and eyes causing irritation and allergies, some affect the endocrine system i.e hormones and some causes cancers (carcinogens) in our body. So we know now, mostly the pesticides are toxic for humans which result in severe health issues. Besides it is evident that pesticide exposure at early age can cause long term risks and also the people exposed are prone to develop diseases such as Leukemia, and cancers of prostate, liver, urinary bladder, breasts, stomach, lungs etc. Many human diseases such as Bronchitis, Asthma, Diabetes, Sclerosis, Autism, Infertility, Respiratory diseases, organ diseases and system failure are linked to the pesticide exposure.



Source- Springer

### **Solution**

Following are the 5 ways to minimize the pollution from Agrochemicals:-

1. Organic Farming
2. Precision Farming
3. Better Land Use
4. More Plants, Less Animals
5. Waste Management

### **References**

Riaz Shah (2020), Pesticides and Human Health, Chapter Metrics Overview ([intechopen.com](http://intechopen.com))

Stefen Ruge (22/11/2021), The Effects of Agrochemicals on the Environment, Coffee and Climate (News Article)

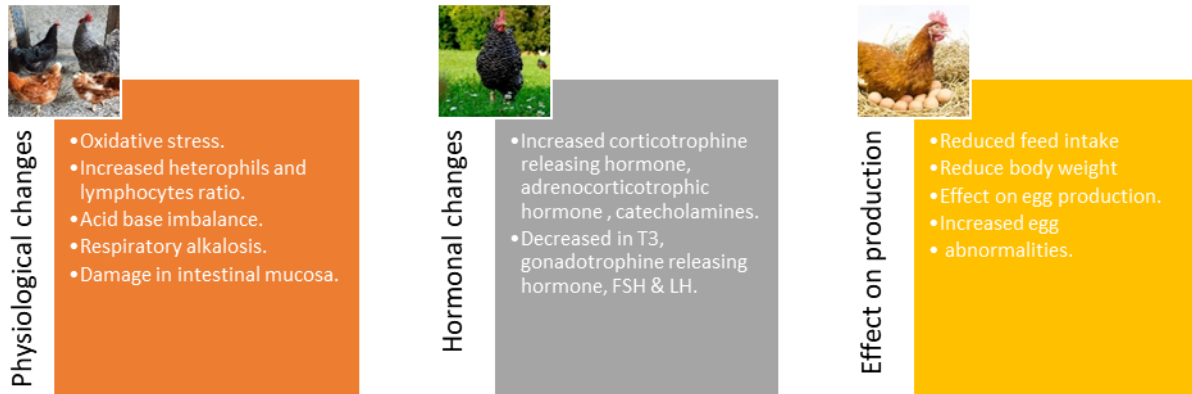
**TORRIDITY : A STRESS ON POULTRY PRODUCTION****Kintali Monika<sup>1</sup>, Mohd. Abdul Rawoof<sup>1</sup>, Adarsh Dangwal<sup>2</sup>**Yogita Shah<sup>1</sup> and Chandan Kumar<sup>2</sup><sup>1</sup>Uttaranchal (PG) College of Bio- Medical Science & Hospital, Dehradun<sup>2</sup>PLANTICA- Indian Academy of Rural Development, Dehradun\*Corresponding email- [monikakintali1998@gmail.com](mailto:monikakintali1998@gmail.com)**Abstract**

Heat stress is the most important environmental stress in poultry production and it's a situation where excess of heat is emitted by a bird and causes stress, illness, and even death. Controlling the environmental conditions plays a major role in poultry management. The major impacts of heat stress on poultry are reduced growth and egg production which leads to decrease in poultry and egg quality, weight loss, reduced feed intake, increase in body temperature, increase in mortality rate etc. Poultry is very sensitive to environmental temperatures mainly in heat stress. They require a hot climate ranging from (32-38°C) in their first days of life, but the temperature decreases rapidly by 2.5-3.0°C with age per week. Poultry birds use sand baths to dissipate the heat from body, poultry birds avoid high environmental temperatures and stay in micro environment under the shaded areas. Those birds rose in temperature 37°C and 50-60% humidity show signs of panting and wing lifting, lower feed consumption, high feed conversion ratio, weight loss. The both layers and broilers show very high negative impact with response to high temperatures.

**KEYWORDS:** Heat stress, Mortality rate, Sand baths, Dissipate, Micro environment.**Introduction**

Poultry industry is one of the important sector of livestock production and plays very crucial role in economic growth. The rise in production and consumption of poultry products have negative impacts on birds that effecting the nutrition in human life. The main environmental factor effecting the poultry is heat stress and some other abiotic factors. The poultry birds when they are prone to heat stress leads to changes in behavioural, physiological and immunological responses which leads to unfavourable effects in whole productivity and mostly occurs in hot seasons. The major losses of heat stress in broilers include increase in mortality rate, decreased egg production, reduced growth, decreased meat and egg quality.

Heat stress on birds when the air temperature and humidity uncontrollably increase their body temperature. It is a condition in which birds caused by high temperatures, when combined with high relative humidity and low air speed. Heat stress is a major problem with every poultry unit as it has high out puts which leads in greater metabolic activity and thus greater body heat production. In layers and broilers heat stress mainly affect on egg and meat production. Due to major impact on meat and egg production the productivity of farm is also greatly affected.

**Changes occurs due to heat stress on poultry production**

**Fig -1 :** Schematic representation of changes occurs in physical, hormonal, and effect on production due to heat stress in poultry production.

**Effect of heat stress on poultry production**

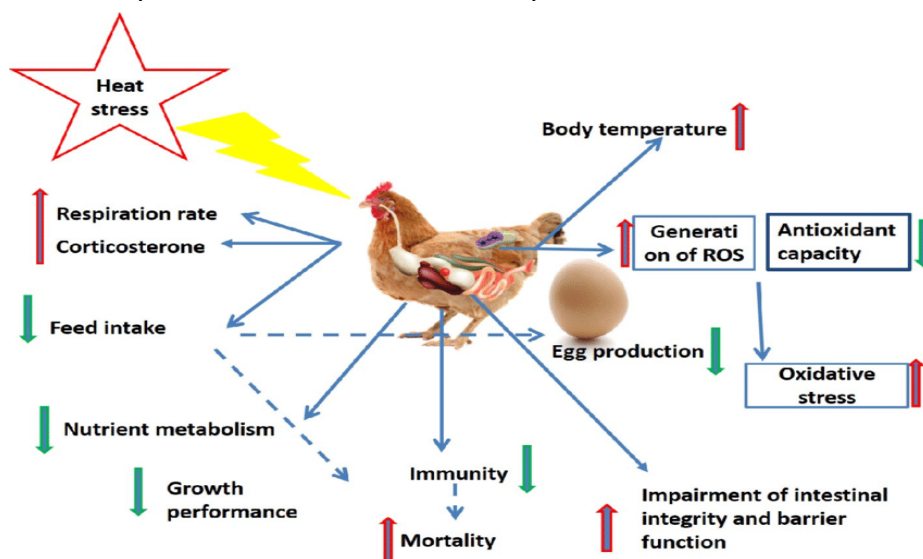
The major effects of heat stress that a poultry bird causes in production and development in poultry unit is.

**Impact of heat stress on internal functions of body**

By the absorption of excess environmental heat a bird rises its body temperature and causes heat stress, which results in the increase in generation of ROS (Reactive oxygen species) and oxidative stress, respiration rate, corticosterone, increases and causes greater impact on impairment of intestinal integrity and barrier function which leads to mortality of poultry bird.

**Impact of heat stress on production**

By the absorption of excess environmental heat the bird rises its body temperature and increases in respiration rate and corticosterone which leads to gradual decrease in feed intake and it impacts on decrease in egg production, decrease in antioxidant capacity. As the nutrient metabolism of body gets decreased growth performance and immunity gradually decreases and result in stunted growth, lowers immune system and increase in mortality rate.



**Fig 2:** Schematic representation on major effects of heat stress on poultry showing increase and decrease in body metabolism and production with response to heat stress.



### Effects of heat stress on meat quality

Long term heat exposure to birds negatively affects the meat quality and fat deposition in broilers as follows:

- Lowering the quality of meat in broilers.
- Proportion of breast muscle is decreased.
- Proportion of thigh muscle in broilers is increased.
- Lowering of protein content.
- High fat deposition

### Symptoms

- Less feed intake.
- Drinking more water.
- Elevated wings.
- Increase in mortality rate.
- Reduced growth.
- Less moving or walking.
- Panting
- Prostration



**Fig 3:** The diagram showing the bird with elevated wings, low immunity, less feed intake ability, due to the effect of heat stress



**Fig 4:** The diagram representing a hen panting due to heat stress.

### Prevention

**Providing better ventilation:** The removal of heat by increasing in ventilation is our first priority. We can manage the heat in the flock by providing air flows at bird levels.



**Fig 5:** The diagram showing proper sufficient ventilation in the unit to avoid heat stress.

**Reduced density of birds:** The lesser the no. of birds in a flock lowers heat stress.



**Fig 6:** The figure showing the density of birds in and poultry unit. As to reduce the heat and co2 percentage

**Supply minerals and electrolytes:** Addition of electrolytes in flocks drinking water is more affective . Due to heat stress their will be a greater loss of several minerals. Potassium chloride electrolytes tends to increase water intake when it is incorporated in to drinking water by 0.6%.

**Feeding :** Most of the birds are hungries in the morning they need to be filled up. This leads to heat stress in the afternoon .

**Managing water:** Birds increase their water intake by 2-4 times upon the normal intake, hence its its recommended to keep the sufficient water area, cool water temperatures wich encourages the birds in drinking water.

**Provision of sodium bicarbonate:** The provision ofsodium bicarbonate will be more effective in case if it in incorporated in to the feed or with the use of carbonated water specially it helps in increasing in egg production. Carbondioxide release and panting changes the acid base balance in poultry.

### **Conclusion**

In this article we summarise that recognition of extreme heat on poultry is the main factor which is commonly effected in poultry production. It majorly effects on the productivity and economy of poultry farm. It has many negative impacts on broilers and layers by decreased

growth, low egg production which results in decreased poultry and quality of egg. Finally we will highlight that The heat stress causes adverse effects on the poultry farm which leads to the total mortality rate of poultry birds if in case we neglects to take respective precautions like provision of better ventilation, managing water, feeding, provision of electrolytes and sodium bi carbonate, provision of air flows at birds level.

**References**

<https://extension.umn.edu/poultry-care-and-management/preventing-heat-stress-poultry>

<https://www.slideshare.net/ossamamotawae/impacts-of-heat-stress-on-poultry-production>

## **SYMPTOMATOLOGY, TRANSMISSION AND MANAGEMENT OF CHILLI ANTHRACNOSE (*COLLETOTRICHUM CAPSICI*)**

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### **Introduction**

Chilli (*Capsicum annum* L.) is a popular commercially cultivated hot tasting berry crop and it is the fourth major crop cultivated globally and belongs to Solanaceae family. Among different biotic constraints, anthracnose disease is one of the major limiting factors affecting chilli producers and result in substantial yield loss. In severe cases, pre and post-harvest yield losses accounts up to 50% in India (Sahitya *et al.*, 2014). The chilli crop is affected by various diseases caused by fungi, bacteria, viruses, nematodes and physiological disorders at different stages of development. Among the fungal diseases, fruit rot (*Colletotrichum capsici*) is a major disease in foot hills of Nagaland.

Due to this disease more than 50% crop losses have been reported from different parts of India (Ramchandran *et al.*, 2007). For the first time, the disease was reported in India from Coimbatore of Madras presidency (Sydow, 1913). Fruit rot mainly becomes challenging when it attacks mature fruits, causing both pre and post-harvest fruit decay, causing severe economic losses (Hadden and Black, 1989; Bosland and Votava, 2003). However, India has been a leading producer, consumer and exporter of chilli especially in dried form. Various varieties of the crop are found in India and its quality varies among the states of the country.

### **Symptomatology**

The disease causes severe damage on red chilli fruits. Fruit rot mainly becomes problematic when it attacks mature fruits. The affected fruits along with other aerial parts bear black dot like numerous scattered acervuli of the fungus. Ripe fruits are frequently affected leading to ripe rot symptoms which appear as small circular spots later turning to more or less elliptical.

Typical fruit symptoms are circular or angular sunken necrotic tissues, with concentric rings of acervuli that are often wet and produce pink to orange conidial masses. Under severe disease pressure lesions may coalesce. Conidial masses may also occur scattered or in concentric rings on the lesions (Fig. 1). Fruits showing blemishes have reduced marketability (Manandhar *et al.*, 1995). *Colletotrichum gloeosporioides*, the predominant species on chilli in Korea, was differentiated into G and R strains by isozyme analysis of esterase, leucine amino peptidase, phosphatase and glutamine oxaloacetic transaminase (Park *et al.*, 1987).



Fig. 1. Chilli plant affected with anthracnose disease (a-b),  
Chilli fruits showing typical anthracnose symptoms (c-d)

Infected fruits bear numerous acervuli on discoloured areas. Such fruits when split open show minute elevated spherical stromatic masses of the fungus on the inner side of the infected fruits. Inside the infected fruits, seeds are discoloured and rusty in appearance and bear small pin head like structures on seed surface is the acervuli of the fungus. This infection reduces seed germination, seed weight, pod weight and number of seeds per pod. Small anthracnose lesions on chilli fruits reduce their marketable value (Manandhar *et al.*, 1995).

### Transmission

Pathogen transmits through infected seeds to germinating seedlings. Often infected seeds fail to germinate or if germinated give rise to infected seedlings which show black acervuli on cotyledons. Such germinating seedlings produce chlorotic lesion at first true leaves and hypocotyl region of the seedlings at earlier phases which later girdle the stem often leading to seedling mortality in nursery. The disease is seed and soil borne as well as air borne and affects seed germination and vigour to a greater extent (Ahmed, 1982 and Asalmol *et al.*, 2001). The pathogen *C. capsici* is seed transmitted in chilli in the form of acervuli and micro sclerotia (Perenzny *et al.*, 2003) and can also survive on other solanaceous or leguminous crops, plant debris and rotten chilli fruits in the field. Under field conditions, the role of seed borne inoculum becomes secondary as the pathogen is soil borne and disseminates through air-borne inoculum. However, the seed borne inoculum plays a potential source of infection for the areas where the disease is not prevalent. The infection is also transmitted from seed to seedling in asymptomatic manner.

### Management

There are various methods for management of plant disease. No single strategy is found to be very effective for chilli anthracnose disease management. Agrios (2005) recommended an integrated disease management approach. Effective approaches for disease management usually involve the combined use of intrinsic resistance along with cultural, mechanical, biological and chemical methods (Wharton and Dieguez-Urbeondo, 2004). Many studies have clinched that disease management practices are often inadequate to eliminate the diseases. Breeding to develop the long-lasting resistant varieties has also not been successful due to involvement of multiple *Colletotrichum* species in anthracnose infection.

Soaking of chilli seeds for 12 hours with Thiram (0.2%) is the best way to control *Colletotrichum* species. The strobilurin fungicides azoxystrobin, trifloxystrobin and pyraclostrobin have recently been recommended for the control of chilli anthracnose (Than *et al.*, 2008). Furthermore, many fungicides have been found to be effective, including 0.2% Mancozeb, Ziram (0.1%), Blitox 50

(0.1%), Bavistin (0.5%) or Bordeaux mixture (1%); Benlate and Delsene M as seed dressings (CPC, 2007).

Slurry seed treatment with either Carbendzim, Thiram, Vitavax, Blitox, Bayleton @ 2.5 g/kg or combination of Vitavax (1.5 g/kg) + *Trichoderma harzianum* (5 g/kg) followed by foliar sprays on seed bed with mancozeb @ 0.2% improved seedling stand and reduced seed borne infection and seed rot.

To overcome the negative effect of chemical usage, use of plant extracts and/or biocontrol agents suiting to a particular agro-climatic region will prove helpful in better management of the disease. More studies are required for acquiring in-depth information regarding various modes of infection by the pathogen and the variability of the pathogen associated with the disease with a focus on the post-harvest as well as pre-harvest loss in the production of chilli crop.

### References

- Agrios G. N. (2005). Plant Pathology, 5<sup>th</sup> Ed. Academic Press, San Diego. pp. 922.
- Ahmed S. S. (1982). Studies on seed borne aspects of anthracnose of chillies caused by *Colletotrichum capsici* (Sydow) Butler and Bisby. Ph.D. (Agri.) Thesis, Univ. Agric. Sci., Bangalore. pp. 73
- Asalmol M. N., Kale V. P. and Ingle S. T. (2001). Seed borne fungi of chilli, incidence and effect on seed germination. *Seed Res.* 29 (1): 76-79.
- Bosland P. W. and Votava E. J. (2003). Peppers: Vegetable and Spice Capsicums. CAB International, England. pp. 233.
- CPC. (2007). Crop Protection Compendium.
- Hadden J. F. and Black L. L. (1989). Anthracnose of Pepper Caused by *Colletotrichum* spp. Proceeding of the International Symposium on Integrated Management Practices: Tomato and Pepper Production in the Tropics; Taiwan; Asian Vegetable Research and Development Centre. pp. 189-199.
- Hong J. K. and Hwang B. K. (1998). Influence of inoculum density, wetness duration, plant age, inoculation method, and cultivar resistance on infection of pepper plants by *Colletotrichum cocodes*. *Plant Disease.* 82 (10): 1079-1083.
- Manandhar J. B., Hartman G. L. and Wang T. C. (1995). Anthracnose development on pepper fruits inoculated with *Colletotrichum gloeosporioides*. *Plant Disease.* 79: 380-383.
- Park W. M., Park S. H., Lee Y. S., Ko Y. H. (1987). Differentiation of *Colletotrichum* spp. causing anthracnose on *Capsicum annuum* L. by electrophoretic method. *Korean Journal of Plant Pathology.* 3: 85-92.
- Pernezny K., Roberts P. D., Murphy J. F. and Goldberg N. P. (2003). Compendium of pepper diseases. The American Phytopathological Society. pp. 73.
- Ramchandran N., Madhavi R. K. and Rathnamma K. (2007). Current status of chilli anthracnose in India. The first International Symposium on chilli Anthracnose. 25, Convention centre, Seoul National University, Korea. pp. 26.
- Sahitya, U., Lakshmi, R., Sri Deepthi and Krishna, M. (2014). Anthracnose, a Prevalent Disease in Capsicum. *Research Journal of Pharmaceutical, Biological and Chemical Sciences.* 5(3): 1583-604.
- Sydow H. (1913). Beritrag Zur Kenntisder Dilzflorade Sudlie Kenostindiens.

- Than P. P., Jeewon R., Hyde K. D., Pongsupasamit S., Mongkolporn O. and Taylor P. W. J. (2008). Characterization and pathogenicity of *Colletotrichum* species associated with anthracnose disease on chilli (*Capsicum* spp.) in Thailand. *Plant Pathology*. 57 (3): 562-572.
- Wharton P. S., Diéguez-Urbeondo J. (2004). The biology of *Colletotrichum acutatum*. *Anales del Jardin Botanico deMadri*. 61: 3-22.

## **ORGANIC FARMING AS A VIABLE ALTERNATIVE TO CONVENTIONAL AGRICULTURE IN MANIPUR**

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### **ABSTRACT**

While sustainable agriculture and organic farming has become a modern-day buzz word, it is not really a new concept. Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, genetically modified organisms and livestock food additives. In the 1950's and 60's, for a newly independent India it was extremely essential to become self-sufficient and self-reliant as far as food production was concerned. Green Revolution then soon changed the course of history of Indian agriculture with the introduction of high yielding variety seeds, increased area under farming, double-cropping, increased use of inorganic fertilizers and pesticides, etc. However, the achievement was at the expense of ecology and environment and to the detriment of the well-being of the people. While the Green Revolution did give an immediate high result and solution to the post 1960's Indian farmers and populace, on the other hand it did have some serious long-term impacts that we did not desire. Thus, organic farming emerges as a strategy to lower the rate of destruction in the present scenario.

**Keywords :** *Sustainable, organic farming, ecology and environment.*

### **INTRODUCTION**

The term '*organic farming*' was coined by Lord Northbound in his book *Look to the Land* (written in 1939, published 1940). Organic farming or agriculture includes all agricultural systems that promote the environmentally, socially, and economically sound production of food and fibres. According to FAO, organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including bio-diversity, biological cycles and soil biological activity and this is accomplished by using on-farm agronomic, biological and mechanical methods of exclusion of all synthetic off-farm inputs. The International Federation for Organic Agriculture Movement (IFOAM) definition of organic farming is based on the principle of health, the principle of care, the principle of fairness, and the principle of ecology (Barik, 2017).

### **The present scenario and the future prospects of organic farming**

Organic farming is practised in 187 countries and 72.3 million hectares of agricultural land were managed organically by at least 3.1 million farmers. The global sales of organic food and drink reached more than 106 billion euros in 2019 (FAO, 2021). A new report by Delhi-based non-profit Centre for Science and Environment (CSE, 2022) released virtually has presented evidence that organic and natural farming is not only profitable and sustainable but also productive (DTE, 2022). India is home to the largest number of organic food producers worldwide, with Sikkim being the 1<sup>st</sup> fully organic state in 2016. However, the organic farming movement is still at a very nascent stage around the world. Organic farming is becoming the gold standard for agriculture around the world. The real question the scientific community should seriously ponder upon today is, can



organic farming feed the world? By 2050, the global community needs to increase food production by 20-70%. According to the report, food production is heading in the right direction, but it is harming the planet to increase its food supply. Not surprisingly, this is unsustainable. We need to find better and more sustainable ways to get our food. Organic farming plays an active role here. We should be clear about the simple fact that it is not about producing more food rather, it is about producing more suitable food. Foods which are more nutritious, vitamin-rich, environment friendly, socially, culturally and economically viable than conventionally produced foods. According to the International Fund for Agricultural Development (IFAD), India has more than 15,000 certified organic farms. Questions like 'Can organic farming meet the demand for food demand in the market?', 'Can organic farming provide the essential *essential nutrients* required by the human body?', 'Do organic products have more nutrition?', 'Can organic farming be a viable alternative to feed the growing population?', 'Is it possible to manage pests and diseases in organic farming?', 'Is organic farming economically feasible?', needs to be answered.

### **How to promote organic farming as a sustainable method of food production for the future?**

The following points are few distinctive and important steps to be considered to promote organic farming as a sustainable method of food production for the near future:

1. Improving the productivity and competitiveness compared to conventional farming methods.
2. Providing access to markets and information.
3. Improving the quality of organic inputs and certification.
4. More investment in research and development to improve the productivity and competitiveness of organic farming.
5. Raising awareness to consumers on the benefits of organic farming in the long run.
6. Sellers need to win consumer's confidence and built trust.
7. The government can play a crucial role in promoting organic farming by providing technical and financial support to farmers, promoting awareness of the benefits of organic farming, and creating a favourable policy environment for organic farming.

### **Success story**

Heikham Chanbi of Khurkhul village in Manipur is an organic farmer. In Manipur, the Manipur Organic Mission Agency (MOMA), works under the department of horticulture and soil conservation to promote organic farming and related activities in the state, and aims to convert maximum area of the state into chemical-free organic zones by 2025. Currently, 37,500 ha of cultivable area in the state follows organic farming under MOMA. The State line departments and central level organisations like Central Agricultural University (CAU) and ICAR Research complex for NEH Region, Manipur centre are actively supporting farming communities in the state to move away from chemical farming. A training programme organised by the Krishi Vigyan Kendra of Imphal West District, and ICAR, Manipur Centre, turned out to be a significant step toward her motivation. Working as a 10 membered self-help group called "Loijing", they are the recipient of loans worth Rs. 50,000 in 2018. Self-produced vermicompost and Bokashi infrastructure in her backyard is the source of manure in her farm. "Our incomes have improved, our food tastes better and stays fresh longer and we are all in good health," she added and wishes that the entire community should follow similar farming models (Sobhapati, 2023).

## Conclusion

The popularity of organically grown foods is increasing day by day owing to their nutritional and health benefits. An example is that of Manipur government's (MOMA- Manipur Organic Mission Agency) campaign "Go Organic, Grow Healthy.", under which 37,000 organic farmers covering 37,500 ha have been registered as beneficiaries of the scheme growing 8 horticultural crops viz., Pineapple, Tamenglong Orange, Kachai Lemon, Passion fruit, Kiwi fruit, King Chilli, Ginger, Turmeric, and 3 agricultural crops: Chakhao (Black Aromatic Rice), HYV Paddy and Maize. Therefore, organic farming has a great impact on the health of a nation like India by ensuring sustainable development. So organic farming is the sole alternative for our clean and sustainable future. Besides, it is an efficient and promising agricultural approach for environmental sustainability as it provides yield stability, improves soil health, no environmental concerns, organic food and reduction in the use of synthesized fertilizers.

It is only a question of future possibility; not a question of present authenticity. The possibility of organic farming to be used as an alternative to conventional farming at present owing to their limited total area under organic, low yield or productivity, high input costs, marketing problems, lack of financial support, absence of appropriate agriculture policy, inability to meet the export demand, lack of awareness and it's political and social factors may be a far cry but it is not far from possibility if requisite and immediate measures and steps for its promotion are taken.

Considering the increasing awareness about the safety and quality of foods, long term sustainability of the system and accumulating evidences of being equally productive, the organic farming has emerged as an alternative system of farming which can not only address the quality and sustainability concerns, but also ensure a debt free, profitable livelihood option. Therefore, organic farming can be a viable alternative to conventional farming.

## References

- Barik A. K. (2017). Organic Farming in India: Present Status, Challenges and Technological Breakthrough. In souvenir: The Third International Conference on Bio-resource and Stress Management, 2017. 84 – 93.
- DTE 2022. Agriculture: CSE's new report presents irrefutable evidence of the benefits of non-chemical agriculture. Accessed on 22/04/2023. Available on: <https://www.downtoearth.org.in/news/agriculture/cse-s-new-report-presents-irrefutable-evidence-of-the-benefits-of-non-chemical-agriculture-81382>
- Helga Willer, Jan Trávníček, Claudia Meier, Bernhard Schlatter (Eds.). The World of Organic Agriculture 2021. FAO report. Accessed on 24/04/2023. Available on: <https://www.fao.org/family-farming/detail/en/c/1378841/>
- SR Reddy. Principles of Agronomy, Kalyani Publishers.
- Sobhapati S. (2023). Organic black rice, organic pineapple, vermicomposting and bio solutions — Chemical-free farming picks pace in Manipur. Accessed on 24/04/2023. Available on: <https://www.gaonconnection.com/kisaanconnection/manipur-organic-farming-black-rice-pineapple-vermicomposting-chemical-free-agriculture-51898>.

## **PARTHENIUM BEETLE, *ZYGOGRAMMA BICOLORATA* PALLISTER : THEIR ROLE AS A WEED KILLER**

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### **Introduction**

The Parthenium beetle, *Zygogramma bicolorata* Pallister, also known as Mexican beetle is a species belonging to Chrysomelidae family and order Coleoptera. It is a species of leaf beetle that is known for its ability to control the protruding weed *Parthenium hysterophorus*. commonly known as carrot grass. This weed is native to the Americas but has spread to several countries around the world, including India.

### **Introduction of parthenium beetle in India**

*Zygogramma bicolorata* was first introduced as a biological control agent for *Parthenium hysterophorus* in India in 1984. The beetle was released by the Indian Institute of Horticultural Research, Karnataka (IIHR, 1991). The foundation of *Z. bicolorata* has led to a significant reduction in the growth and spread of Parthenium. It has been able to establish itself in several parts of India, and its population has continued to increase over time. This success has led to the beetle being considered a potential biological control agent for other invasive weed control.

### **Biology of Parthenium beetle**

Parthenium beetle, *Z. bicolorata* is complete metamorphosis having four distinct life stages viz., egg, larva, pupa, adult (Figure 1).

**Eggs**–The eggs are light yellow colour and laid generally on ventral side of the leaves. Hatching takes place in 4-7 days. The female can lay up to 2500 eggs during its life span.

**Larvae** - There are four instars. The grubs feed for 10-15 days on the leaves and on maturity enter soil for pupation.

**Pupa** – Pupation takes place below soil up to a depth of 15 cm. Beetles emerges after 8-12 days.

**Adult** - Beetles are off white or light reddish in colour with dark brown longitudinal markings on the elytra, measuring about 6mm in length.

**Life cycle** - The life cycle is completed in 22-23 days. The insect completes 5-6 generations under field conditions.

### **Importance of Parthenium beetle as weed killer**

*Parthenium hysterophorus* is a highly aggressive weed that can outcompete native plants, reducing biodiversity and degrading the quality of the soil. It also causes a range of health problems for humans and animals, including skin rashes, respiratory issues, and fever. There is a national strategic plan to parthenium weed eradication from its infested regions. Various methods for eradication have been there as a part of integrated weed management (IWM). Among the several management tactics biocontrol is one of the important approaches.



**a. Egg**



**b. Female beetle laying eggs**



**c. Grub**



**d. Grub and Adult beetle (feeding)**



**e. Adult (male)**



**f. Adult (female)**

**Figure1: Different developmental stages of *Zygogramma bicolorata*  
(Photograph by Yendrembam K Devi)**

The use of parthenium beetle as a bio-control agent is an effective and sustainable alternative to chemical herbicides, which can have negative impact on environment and human health. *Zygogramma bicolorata* has been found to be most effective in suppressing the growth of *Parthenium*. During 1983-1984 Parthenium beetle was introduced to India in Bangalore (Gautam,

2008 and Shrestha, 2010). The beetle is also easy to rear and distribute, making it a cost-effective solution for controlling the spread of *P. hysterophorus*. It helps to reduce the impact of parthenium weed on biodiversity, soil quality, and human and animal health.

The beetle is a natural enemy of the weed, feeding on the leaves and causing significant damage to the plant. The larvae of *Z. bicolorata* feed on the leaves, skeletonizing them. While the adult beetles feed on the foliage, flowers and stems (Figure 1: c-f). There is a report of feeding damage incurred in sunflower, but the injury is insignificant and there is no report of damage to any other crops.

### **Conclusion**

In conclusion, Mexican beetle or parthenium beetle, *Zygogramma bicolorata* is a promising biological control agent for the invasive weed *Parthenium hysterophorus*. While its success in controlling this weed has been significant, there are still concerns about its potential impact on non-target species. There was a report of this beetle feeding on the sunflower plants. Continued monitoring and research will be necessary to ensure that the introduction of *Z. bicolorata* does not have unintended consequences.

### **References**

- Gautam, R.D., 2008. Biological Pest Suppression, 2nd edition. Westville Publishing House, New Delhi
- Shrestha, B. B., Poudel, A., Kc, J., Karki, D., Gautam, R. D., & Jha, P. K. (2010). Fortuitous biological control of *Parthenium hysterophorus* by *Zygogramma bicolorata* in Nepal. *Journal of Natural History Museum*, 25, 332-337.
- IIHR, 1991. Biological Control of Parthenium using Mexican Beetle. Extension folder. Bangalore, India: Indian Institute of Horticultural Research, 8:1-6.

## MAJOR CONSTRAINTS AND PROSPECTS IN ADOPTION OF MUSHROOM FARMING

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India's annual mushroom production is still negligible as compared to world production. Presently, about 1,00,000 tons of fresh mushroom is being produced in India as against over 7 million tons world production of mushroom annually. In spite of four decades of planned efforts, the pace of mushroom cultivation is slow in our country. Apart from technical know-how, the climate for cultivation of various kinds of mushrooms is also conducive and the raw materials (agro-waste) required for their substrate preparation are available in plenty in rural India. Despite all the favourable conditions, the cultivation of mushrooms in India is still primitive and is not spreading fast. Several reasons, which may be directly or indirectly related to the slow development of mushroom cultivation, are presented.

- (i) **Monetary gain:** It is the prime factor for the growth of any profession. Mushroom farming is a highly remunerative enterprise with quick return in very short period. Studies have shown that this activity can be placed at third place just after crop and animal husbandry, as far as monetary gains are concerned. Hence, several ICAR institutes, CSIR institutes, State Department of Horticulture, Agricultural and general Universities and various reputed N.G.Os are working on various aspects of mushroom cultivation and its adoption.
- (ii) **Lack of good quality spawn:** The yield of mushroom depends upon spawn quality. Good quality of spawn should be free from diseases with high yield potential. The non-availability of quality spawn is a common problem of the growers. Generally, the private spawn producers who are not equipped with the knowledge & facility for mushroom production are selling the spawn claiming that they have developed new high yielding strains. In fact, the spawn producers procure the mother culture of mushroom from Govt. organization or prepare the culture by selecting a healthy mushroom and using it for making commercial spawn of mushroom with their own brand name. Sometimes, mushroom growers get immature spawn which results in delayed spawn run.
- (iii) **Uncontrolled price structure of mushroom:** When there is a glut in the market, the price of mushroom falls down to Rs. 20-30/kg but as the demand increases or shortage of mushrooms in the market the prices rise upto Rs. 60-70/kg. Thus there is always an uncertainty in market price of mushroom which reduces the amount of net profit and discourages the mushroom growers. This problem gets aggravated during peak production months, also because there is no minimum support price from the Govt. even in states with good number of mushroom farmers.
- (iv) **Lack of common facility for pre-cooling and storage of fresh mushroom:** This is also severe problem being experienced by mushroom growers. During the peak production period, growers are unable to dispose off their fresh mushroom on the same day and they are forced to keep it for the next day. In such a situation, the quality of fresh mushroom deteriorates and it also loses weight as it is a highly perishable commodity which can only

be stored for about 12 hrs at room temperature and 2-3 days at 5°C.

- (v) High transportation charges:** Though, agro and animal wastes are available in plenty in India yet their availability is not evenly distributed. Due to diversified climate and topography of land, different kinds of crops are raised in different parts of the country. For instance, wheat and paddy straw is easily available at cheaper rates in the plains of north India while the same is a scarce commodity in the hilly regions. Since mushroom cultivation is based on agro-waste, the raw materials required for its cultivation are usually transported from plains to hills in huge quantity and mushroom growers have to pay heavy transportation charges resulting in avoidable increase in cost of production and reduction in net profit.
- (vi) Commercial rate of electricity tariff:** Mushroom growers have to pay electricity charges at commercial rate, although mushroom farming is an agricultural activity. Many times it has been highlighted by the concerned scientific community during scientific gatherings, seminars, meetings, etc. This has led to high cost of production due to increased capital as well as recurring expenditure on mushroom farming.
- (vii) Lack of marketing facilities:** When a large quantity of mushrooms is harvested per day, its marketing becomes a major problem. Mushroom growers cannot dispose off large quantity of mushroom more than the daily demand in the local market and in near by cities. In such a situation, he has to dispose off the remaining quantity of mushroom either at a distress-price or he has to transport it to different places where demand of mushroom is high.
- (viii) Complex process of obtaining loan/finance:** Mushroom cultivation demands heavy investment in the initial stages. The small & marginal seasonal mushroom growers who want to expand their temporary mushroom farms and those farmers who want to start afresh are usually unable to invest the required amount of money from their own pocket. Therefore, they approach the financial organization to obtain loan for this purpose. But the formalities of financial organization are so complex that the seasonal mushroom growers & farmers can not get the finance easily.
- (ix) Lack of low cost mushroom farm design:** A scientifically designed mushroom farm needs heavy investment and hence is out of reach of small & marginal mushroom growers/farmers. Therefore, there should be a low cost mushroom farm design available, based on locally available material and as per local climatic conditions.
- (x) Lack of training facilities:** Training is an essential component for successful adoption of the technology of mushroom farming. Only a few State Agriculture Universities and KVK's are providing guidance on mushroom farming to farmers. Hence this is a major problem which discourages the farmers to take up the cultivation of this non-traditional crop.
- (xi) Inadequate testing and diagnostic facilities:** Besides technical expertise, mushroom cultivation also demands hygienic conditions in its surroundings. To maintain hygienic conditions in the village situation is very difficult and thus chances of contaminations are much more which sometimes damages mushroom crop to a greater extent. The extent of losses can be reduced if the causes of loss are diagnosed in time and remedial measures are taken urgently. However, there are very few research organizations where quality parameter testing and pest and diseases diagnostic facilities exist. Finally, when mushroom growers need guidance, they approach nearby Agriculture Universities/ State Department of Horticulture/State Department of Agriculture but they often return

without proper solution as these institutions/departments lack expertise for testing the quality parameters as well as diagnosis and control measures of pests and diseases.

**(xii) Lack of Interest of Academia:** There is a lack of interest of academic scientists in the fundamental biological studies of edible mushrooms. This is responsible for delaying the massive production of edible mushrooms and fundamental knowledge of the biological nature of mushrooms cultivated is still meagre. Without such basic knowledge, the development of a mushroom industry is difficult, because cultivation of mushrooms requires very strong regional and local adaptation.

**(xiii)** Last, but not least, is the problem of keeping the techniques secret. Mushroom growers in general do not trust their competitors and, unfortunately, some mushroom researchers also adopt the same attitude toward their colleagues. They should share their experience and knowledge in order to enlarge and promote mushroom cultivation. By sharing their results, they will share the benefits.

**Prospects:** The prospects for cultivation of edible mushrooms are basically very good. Let us consider the following points:

1. Mushrooms can convert waste materials into human food. These agricultural materials are resistant to degradation because they contain mainly cellulose, hemicellulose and lignin. The mycelium of mushrooms excretes extensive enzyme complexes, which can directly attack and degrade these components. Therefore, mushrooms can use these wastes as nutrients for their growth, and the mushrooms produced become food for human consumption.
2. Mushrooms are relatively fast-growing organisms. Some tropical mushrooms can be harvested and consumed within 10 days after spawning. By using different varieties, mushrooms can be produced all year. They can be cultivated by using primitive farming techniques in rural areas or by using high technology in populated regions.
3. Mushroom cultivation is labour intensive; however, labour is plentiful in many regions of India.
4. Land availability is usually a limiting factor in most types of primary production. Mushroom production can be concentrated within a relatively small space.
5. Mushrooms have been accepted as human food from time immemorial and can immediately supply additional protein to the human diet. Other sophisticated and unconventional sources of food protein, such as yeast, algal cultures and single-cell proteins, have relatively more complicated requirements and need to be processed before they can be consumed.
6. Mushrooms should be used as a type of vegetable. After improving the culture and cultivation techniques, it should be possible to grow them as widely and cheaply as other common vegetables, which would be greatly beneficial to the public.

The number of cultivated species is increasing, and this will have the effect of augmenting the total world production in the future because new species are unlikely to be substituted for others by the consumers, but they will be added to the ones that are already popular. Production of the existing cultivated species has shown a steady increase for decades and more countries are engaging in mushroom cultivation as an agricultural technology. These factors argue against total mushroom production reaching a plateau in the near future.



## **IMAGE INTERPRETATION A PROMISING TECHNIQUE IN REMOTE SENSING FOR AGRICULTURE**

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### **Abstract**

Image interpretation is the process of scrutinizing images and finding and evaluating their importance based on their position and extent. The application status of image processing technology in agriculture and its effect on agricultural output value, it is easy for people to grasp the significance of image processing technology for agricultural growth. This paper analyses the application of image processing technology in the agricultural field in order to highlight The impact of picture processing technology on agriculture. This study examines the impacts of agricultural pest identification using image processing technology and conventional machine recognition technology.

**Keywords :** Image interpretation, Image processing, Elements, analysis, Agriculture.

### **Introduction**

The process of extracting qualitative and quantitative information about things from aerial photos or satellite imagery is known as interpretation. Visual picture analysis is very helpful in many disciplines, including geography, geology, agriculture, forestry, environment, ocean studies, marshes, natural resource protection, urban planning, and many others.

Agriculture makes significant use of image analysis. It can provide useful details about crops without having to handle them. The primary uses are divided into four groups. The first is agricultural management, particularly in terms of pest and disease monitoring and watering techniques. The second is linked to agricultural leaf and skin condition research, which aids in the detection of nutrient shortages and plant composition. These pictures can also be used for produce quality checks and sorting. Finally, image analysis is used in crop and land assessment for the Geographic Information System and field colour and texture segmentation.

### **VISUAL IMPLEMENTATION**

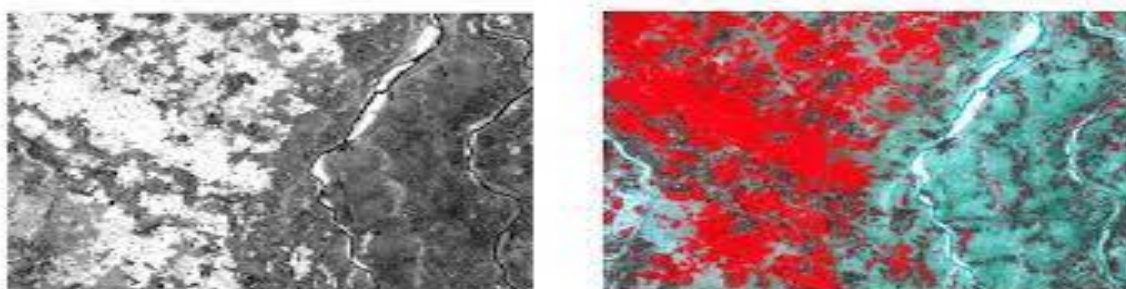
Visual interpretation entails analysing aerial photos and satellite imagery visually.

### **VISUAL IMAGE INTERPRETATION ELEMENTS**

These traits of objects are examined with reference to a single or multiple spectral bands when interpreting satellite images. The following eight components are used in image analysis.

1. Tone
2. Size
3. Shape
4. Texture
5. Association
6. Shadow
7. Site and
8. Pattern.

**Tone**



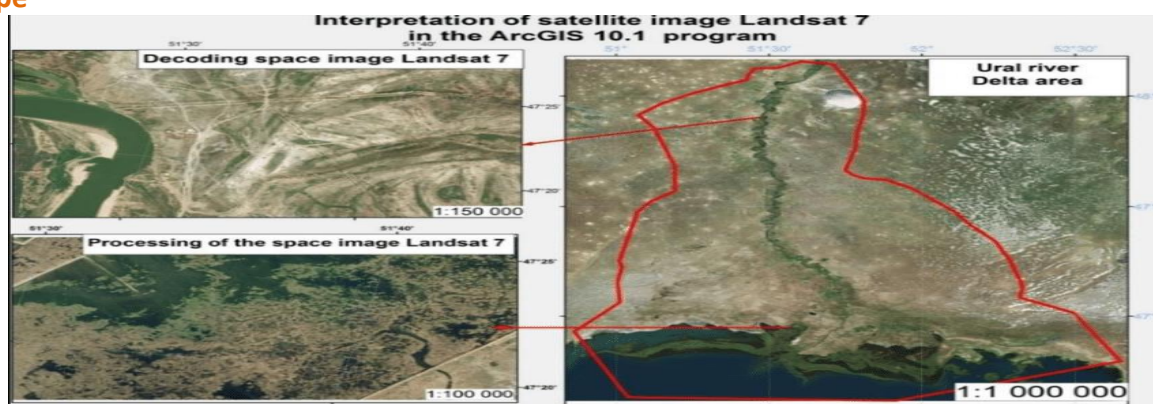
(Fig.1) Area satellite picture in (a) Grey scale and (b) Normal FCC.

**Size**



(Fig.2) Image in high quality displaying various texture

**Shape**

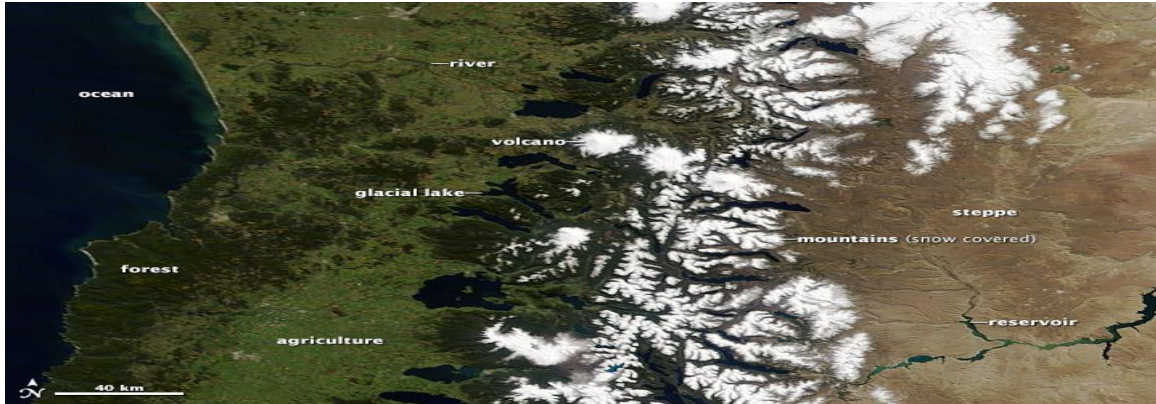


(Fig.3) High-quality image with different patterns

**Texture**



(Fig.4) Satellite picture with various backgrounds. Rough texture and smooth texture.

**Association**

(Fig.5) Central Chile and Argentina have a diverse physical landscape, including snow-capped mountains, gorges, and volcanoes.

**Image interpretation strategies:**

- 1) **Identification:** Ex: Land-cover
- 2) **Indirect Interpretation :** To map something that is not directly seen in the image.
- 3) **From known to unknown.** This we can get from field observation.
- 4) **From direct to indirect :** The images like tree canopies, shadows.
- 5) **Use of collateral information:** Topography

**Interpretation and analysis :**

The detection and assessment of different objects in a picture to derive usable information about them is involved in the interpretation and analysis of remote sensing images. Targets can take the form of a spot, line, or area feature. The subject must be distinguishable; it must stand out from the other elements in the picture.

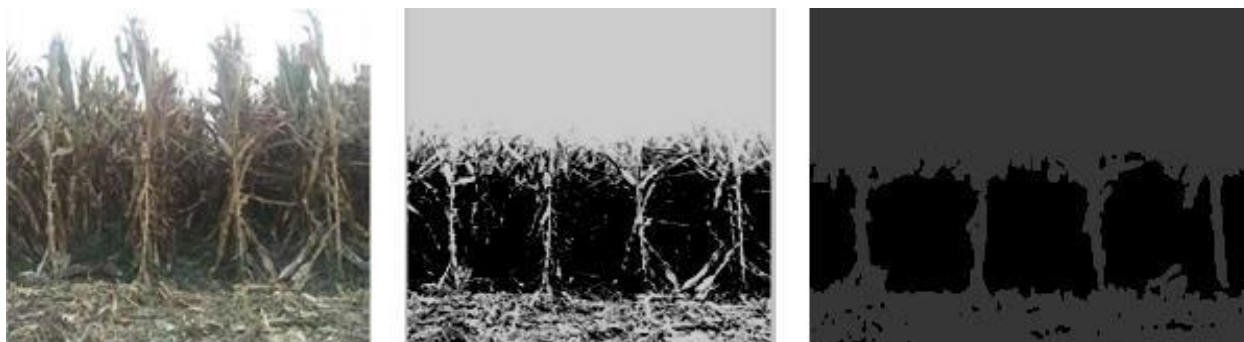
**Agriculture Image Processing Applications**

Agriculture makes extensive use of image processing. In the farming sector, This technology is primarily used to monitor crop development, detect diseases and bug pests, monitor nutritional state, monitor maturity, and determine crop colour. Among them, 29.3% is used to monitor crop development, which is primarily used to correctly assess crop growth state. The percentage of illnesses, bug pests, and weeds diagnosed is 14.5%.

**Agriculture and scenery image identification**

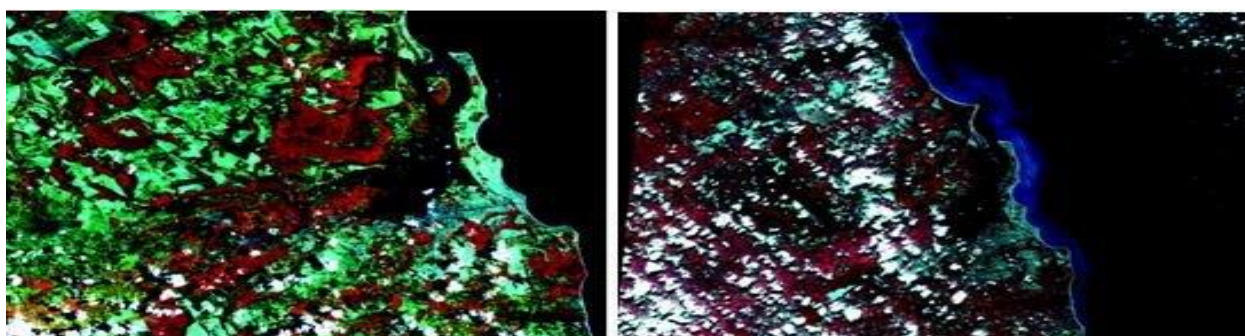
Planting a corn-based crop Recognition of images: Corn is a spring crop; when produced in various climatic circumstances, the spacing between corn rows varies due to picture processing and The distance between segments is measured using a digital monitoring camera. The corn harvester's cutting table is then adjusted. Technological advancements of image identification and processing enable the harvesting of farm goods to be automated and thus more efficient harvesting agricultural products.





(Fig.6) Sequential image editing stages

**Terrain identification from satellite pictures:** Satellite photographs from 1985 and 1996 used for visual interpretation of the Brazilian river Rio Paraiba's mouth. The comparison showed a shift in the Paraiba River's path over several kilometers, a change in the shoreline due to ocean currents the constancy of boundaries between sugarcane fields, pastures and original coastal forests. Remote sensing using satellites is often used to map earth's surface and assess the ecological state. Especially for different types of vegetation, this method is more efficient.



(Fig.7) Satellite views of the Rio Paraiba estuary in 1985 and 1996.

### Conclusion

This paper studies on image identification, processing Analysis. On the creation of techniques for recognising agricultural landscapes with vegetation have been detailed. They use image interpretation and processing to categorize items and scenes using image recognition methods. This article provides a summary and analysis of some recent research in the area of agriculture image interpretation in order to evaluate the chances for their implementation in future growth.

### Reference

- Bhatta, B. (2010), Remote sensing and GIS, Oxford University Press, New Delhi.  
Pandurgn J.A., Lomte S.S., Digital image Processing application in agriculture: A survey, 2015.  
Sabins, F.F. (2008), Remote Sensing – Principles and Interpretation, 2nd Edition, W.H. Freeman and Co., San Francisco.

## **UNDERSTANDING RURAL LIVELIHOODS IN INDIA: CONCEPTS, CHALLENGES AND INTERVENTIONS**

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### **Abstract**

Rural livelihoods in India have been a subject of study for many years due to their critical role in the country's economy and society. It is necessary to comprehend an overview of the concepts, challenges, and interventions associated to rural livelihoods in India. The livelihood definition have five categories which include human capital, physical capital, financial capital, natural capital and social capital. Challenges faced by rural communities include poor infrastructure, lack of access to credit, and limited market opportunities. Various interventions have been implemented to address these challenges, including the provision of rural infrastructure, promoting financial inclusion, and supporting entrepreneurship. Overall, this article highlights the rural livelihoods in India and the need for continued efforts to improve the lives of rural communities.

### **Introduction**

Livelihoods are the means by which individuals and households sustain their lives by generating income. In India, a significant portion of the population, particularly those in rural areas, depend on agriculture and related activities for their livelihoods. According to a report by the National Sample Survey Office (NSSO), approximately 58% of rural households in India rely on agriculture and related activities for their livelihoods (NSSO, 2013). The NSSO report also emphasizes the importance of non-farm activities in rural livelihoods, which account for around 42% of rural households' income. However, despite the crucial role of agriculture, the sector's productivity levels have remained low due to several challenges. For instance, access to credit, technology, and markets have been inadequate, resulting in low crop yields and poor returns on investment. (Minten et al., 2013). These challenges have led to a decline in the rural economy, migration to urban areas, and an increase in poverty levels (Niehof, 2001). Therefore, understanding the challenges faced by rural livelihoods in India is critical for policymakers, development practitioners, and researchers to design and implement effective strategies that can help to improve the livelihoods of rural communities and ensure sustainable development (Kumar, 2020).

### **Concept of Rural Livelihood**

A sustainable livelihood involves capabilities, assets, and activities necessary for living, which can recover from shocks and maintain or enhance assets without harming the natural resources. This concept, developed by Chambers and Conway, is widely accepted and used by agencies like DFID. The vulnerability context, influenced by external factors like trends and seasonality, impacts livelihoods, and people utilize five types of assets to pursue different strategies. Shocks, such as natural disasters and economic uncertainty, can also affect livelihoods (Niehof, 2001). Transforming structures and processes affect the vulnerability context, which, in turn, affects a household's assets. Livelihood assets are classified into five categories: human capital, physical capital, financial capital, natural capital, and social capital.

### **Rural Livelihood and National Economy**

Rural livelihoods are pivotal for employment and income generation in the Indian economy. About 58% of rural households depend on agriculture and related activities, highlighting the sector's significance. Non-farm activities have also gained importance, contributing around 42% of rural households' income. Factors such as rising rural incomes, infrastructure development, and market access drive the growth of the rural non-farm sector. The agricultural sector, contributing 16% to India's GDP and employing half the workforce, plays a critical role in food security and exports. India is the world's largest milk, pulses, and spices producer and second-largest rice, wheat, and fruits producer (World Bank, 2021).

### **Rural Livelihood Development**

Rural livelihood development aims to improve economic and social progress in rural areas by addressing the economic, social, and environmental needs of individuals. This approach is vital for several reasons:

- i. *A large proportion of the population resides in rural areas:* About 75% of the total population lives in rural areas, with the rural population accounting for 65.53%. However, they have lagged behind the overall progress of the economy (Vedantu, 2023).
- ii. *Agriculture is the primary source of livelihood:* Agriculture remains a critical source of livelihood in rural areas, supporting more than two-thirds of India's population. Therefore, developing agriculture will contribute significantly to the betterment of rural areas and its people.
- iii. *Lack of basic necessities:* The majority of poor people live in rural areas and lack access to basic necessities such as food, healthcare, and sanitation facilities. Thus, rural livelihood development is crucial to improve the standard of living in these areas.

### **Key issues in rural livelihood development:**

Effective rural livelihood development requires addressing several key issues. Including,

- **Rural poverty:** Poverty is most prevalent in rural areas, where around 30% of the population lives below the poverty line. Although this figure has declined to 21.92% in recent years, there is still a critical need to take action to alleviate poverty in rural areas.
- **Insufficient healthcare:** Access to adequate healthcare is limited in rural areas, which can hinder the physical well-being of individuals.
- **Inadequate infrastructure:** Rural areas often lack basic infrastructure such as reliable electricity, irrigation systems, financial services, transportation options, and markets, which must be improved to support rural livelihoods.
- **Food insecurity:** Food insecurity is a common problem in rural areas due to low agricultural productivity, limited access to markets, and inadequate storage and distribution systems. Improving agricultural productivity, supporting small farmers, and enhancing access to markets and credit can help to address this challenge (FAO, 2020).
- **Environmental degradation:** Environmental degradation, including soil erosion, deforestation, and water pollution, is a significant issue in rural areas. Sustainable land use practices, such as conservation agriculture, agroforestry, and water management, can help to address this challenge (UNDP, 2018).
- **Lack of access to resources:** Rural communities often lack access to resources, such as credit, technology, and infrastructure, which limits their ability to develop sustainable livelihoods.

Improving access to these resources can help to promote rural development and reduce poverty (World Bank, 2015).

➤ **Social exclusion:** Rural communities are often excluded from political and economic decision-making processes, which limits their ability to influence policies and programs that affect their livelihoods. Promoting participatory approaches that involve local communities in decision-making can help to address this challenge (Kumar, 2020).

### **Rural Livelihood Interventions in India**

Livelihood interventions refer to deliberate actions taken by agencies or organizations to create and bolster livelihood opportunities for a significant number of individuals, beyond those employed by them. The Indian government has been a key player in these efforts, but other sectors, including cooperatives, corporations, and NGOs, have also contributed to promoting livelihoods (Vedantu, 2023). Examples for rural livelihood interventions in India follows,

- ♣ Since independence, the Indian government has added over 40 million hectares of irrigation, the largest in human history, which has stabilized the livelihoods of millions of people.
- ♣ The Green Revolution, introduced in the 1960s, impacted the livelihoods of over 40 million farmers and landless laborers through the high yielding varieties package and irrigation through large dams and canal systems.
- ♣ The Sampoorna Gram Samridhi Yojana guarantees wage-employment to the poor in the lean season through public works, such as road building, and pays part of the wages in kind as food grains.
- ♣ The Swarna Jayanti Grameen Swarozgar Yojana promotes self-employment among the poor through bank loans and government subsidies for income-generating assets.
- ♣ Various special government programs and initiatives by sectoral institutions, such as the Employment Guarantee Scheme in Maharashtra and the National Dairy Development Board, promote both wage employment and self-employment.
- ♣ Non-governmental agencies, such as SEWA, BAIF, MYRADA, AKRSP, PRADAN, RGVN, and BASIX, run programs to promote livelihoods in different regions and sectors.
- ♣ Microfinance interventions by banks and NGOs have influenced the livelihoods of over twelve million people.
- ♣ Agri-business companies and co-operatives, such as IFFCO, Tata Chemicals' Kisan Kendras, and ITC Agri Business Division, sell inputs and offer extension services that influence the livelihoods of large numbers.
- ♣ Companies like Hindustan Lever and Nestle, with milk procurement and processing businesses, and Rallis India and Pepsi, with contract farming projects, have impacted the livelihoods of rural people.

### **Conclusion**

Rural livelihood development and interventions are essential for improving the socio-economic conditions of rural communities. To effectively achieve this, interventions must prioritize the needs and aspirations of these communities, empowering them through active participation. The success of these interventions rests on their sustainability, necessitating a comprehensive, long-term approach that factors in the social, economic, and environmental elements that impact rural livelihoods. In essence, rural livelihood development and interventions are the bedrock of inclusive and sustainable development in India. Encouraging and supporting rural livelihoods has the potential to bring about multiple benefits. In addition to improving the economic conditions of

rural communities, it can also promote social equity, reduce poverty, and contribute towards achieving environmental sustainability goals.

### References

- FAO. (2020). Rural livelihoods and food security. Retrieved from <http://www.fao.org/3/a-i3325e.pdf>
- Kumar, R. (2020). Rural livelihoods in India: Issues and challenges. *International Journal of Social Science and Economic Research*, 5(3), 3804-3816.
- Minten, B., Tamru, S., & Kuma, T. (2013). Value chains, liberalization, and rural livelihoods: Evidence from Ethiopia. *Agricultural Economics*, 44(4-5), 395-407.
- National Sample Survey Office. (2013). Employment and Unemployment Situation in India 2011-12. Retrieved from [http://mospi.nic.in/sites/default/files/publication\\_reports/Report\\_no556\\_employment\\_2011-12.pdf](http://mospi.nic.in/sites/default/files/publication_reports/Report_no556_employment_2011-12.pdf)
- Niehof, A. (2001). Rural livelihood systems: Conceptual framework (No. 5). International Potato Center.
- Scoones, I. (2009). Livelihoods perspectives and rural development. *The journal of peasant studies*, 36(1), 171-196.
- Start, D., & Johnson, C. A. (2004). Livelihood options? The political economy of access, opportunity and diversification (p. 223). London: Overseas Development Institute.
- State of India's Livelihood Report. (2020). Retrieved from <https://www.accessdev.org/state-of-indias-livelihood-report/>
- United Nations Development Programme (UNDP). (2018). Human Development Indices and Indicators: 2018 Statistical Update. New York, USA. Retrieved from [http://hdr.undp.org/sites/default/files/2018\\_human\\_development\\_statistical\\_update.pdf](http://hdr.undp.org/sites/default/files/2018_human_development_statistical_update.pdf)
- Vedantu.(2023).Rural Livelihood in India Retrieved from <https://www.vedantu.com/civics /rural-livelihoods-in-india>
- World Bank. (2015). Rural livelihoods. Retrieved from <https://www.worldbank.org /en /topic /rurallivelihoods>
- World Bank. (2021). Agriculture, forestry, and fishing, value added (% of GDP) - India. Retrieved from <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=IN>



## **WOMEN EMPOWERMENT IN AGRICULTURE: MAKING INDIA A BETTER PLACE**

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*“When you educate a boy, you educate one individual, when you educate a girl you educate a nation” – Larry Summers*

### **Introduction**

Rural women around the world play a key role in supporting their households and communities in achieving food and nutrition security, generating income, growing small businesses, and overall well-being. They contribute to agriculture and fuel local and global economies. As such, women are active players in achieving the Millennium Development Goals. Yet every day, rural women and girls face persistent structural constraints that prevent them from fully enjoying their human rights, and hamper their efforts to improve their lives and the lives of those around them.

The dream of socio-economic empowerment of women will not be complete without empowering those who are living at India's last periphery. The ones whose day starts before sunrise and continues after sunset. These are the women farmers of India, whose voices often go unheard owing to their gender, and who struggle to establish their identity at a grassroots level due to patriarchal traditions and gender socialization. Women's work in agriculture is in addition to her role as a wife, a daughter-in-law and as a mother. However, gender based discrimination continues in multiple ways: women are not recognized as farmers in Indian policies thereby denying them of institutional supports of the bank, insurance, cooperatives, and government departments.

These voices need to be heard at both the policy and implementation levels if we are to realize the dream of a progressive India. Women farmers in India perform most of the big farming jobs, from sowing to harvesting, yet their access to resources is less than their male counterparts. Closing this gender gap is essential in order to accelerate the pace of growth in the agriculture sector.

### **Women Empowerment**

While it is heartening to note that NRCWA, KVKS and ICAR Institutes have undertaken several researches and facilitated women in agriculture, there is simultaneous need to empower them in real sense of women empowerment as is being briefly discussed here.

Empowerment in the literature refers to the act of bestowing power and authority on someone. Thus, women empowerment refers to the conferring of leverage to women who are otherwise deprived. This includes granting to women effectual decision-making power/authority and the power to influence others decisions along with economic, social and civil freedom. Empowerment, by its very definition, implies an increase in the ability to exercise power. In India, as in most developing countries, women are believed to be and treated as inferior to men. Moreover, as the lives of women and men are embedded in a matrix of unequal gender relations, a decrease in the gender inequality is necessary for an outcome of 'empowerment' for women. In other words, changes such as increased income, skills and self-confidence, may be better understood as enablers that promote women's empowerment. However, the women, in order to be significantly

empowered to achieve their perceived goal, firstly need authority at home, which in most cases they do not have. The process should, therefore, be carried out concurrently at home and outside. Within the family they must have equal say as men and so should be the case at work. The most extensive element of women empowerment is providing them with social rank, status and justice. Major attributes that contribute to women empowerment are education, social equity and status, improved health, economic or financial stability and political participation. In India, a whopping 56 percent of the women are illiterate as against a considerably 24 percent in case of men, evincing the striking inequality. This has to be significantly enhanced in a five year time-frame. Educating the girl child is now an integral part of the Right to Education Act in force which should, therefore, significantly enhance the women literacy level at par with men in a five year time-frame. This apart adult literacy programmes should be initiated in villages to contribute to the education in female literacy.

### **Indian scenario**

As farmers, agricultural workers and entrepreneurs, women constitute the backbone of India's agricultural and rural economy. Yet, together with children they remain one of the most vulnerable groups. Women shoulder the entire burden of looking after livestock, bringing up children and doing other household chores. The extent of health hazards faced by farm women in farm activities include (i) 50 percent in transplanting and 26.5 percent in harvesting under farm activities (ii) 50 percent threshing, 33 percent drying and 67 percent parboiling under post-harvest activities and (iii) 47 percent shed cleaning, 23 percent fodder collection and 27.5 percent milking under livestock management.

Their hard work has not only been unpaid but also remained mostly unrecognized. They perform on a daily basis the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. They are invariably paid lower wages than men for the same agricultural work. Land ownership titles are most often in a man's name. Men often either take or dictate the decisions concerning farming and women have to compulsorily carry out. Farm produce is marketed commonly by men and that gives them complete control over household finance. More and more women are taking to farming as men are migrating to urban areas for work. But they are not getting access to credit as they do not have pattas. Only 11 percent women have access to land holdings, that too, mostly as small and marginal farmers.

With grossly inadequate access to education and technology, a host of other socio-economic factors have an adverse impact on the lives of women farmers in recent years. Despite their eagerness they have often not been able to take advantage of opportunities from new technologies, innovations and markets. The constraints and opportunities that women face in agriculture vary across the agro-ecological and geographical regions of the country depending upon, among others, the socio-economic-cultural context. Despite many policy reforms and interventions at the macro level gender issues have not received the priority attention they deserve.

### **Let's meet Kanchan Devi, an Agent of Change**

Till a few years ago, 29-year-old Kanchan Devi was just another resident of Lodhipur Khurd, a non-descript village in Baghalpur, Bihar, with just 134 households that are largely dependent on agricultural income and daily wage labour for livelihood. The village that has almost 50% representation of female residents, unfortunately can only boast of approximately 15% female literacy rate. Women here could earlier only dream of economic empowerment.

In May 2016, Oxfam India and SEWA Bharat collaborated to start a unique initiative. The project involved **Economic Empowerment of Women Farmers** through vegetable supply chain in 35

villages of Munger and Bhagalpur district of Bihar. Lodhipur Khurd was selected as this project's first intervention village.

Women farmers were onboarded through multiple village awareness programmes. Finding the participants a little hesitant at first, the project implementation team decided to build a rapport with the female farmers and appealed to them to join hands for the shared goal of economic empowerment.

It was during these village meetings that Kanchan Devi contacted our implementation team and took the lead in our community awareness programmes. During initial phase, she was also apprehensive but her confidence in the future success of the programme grew. The collective action and participatory approach of the project design too restored her faith in the project.

As a lead farmer, Kanchan attended several training and capacity building programmes on sustainable agricultural practices and learnt about women farmers' rights and entitlements. Soon, she was equipped to be a local trainer in her community.

Now she is the president of a village-level women vegetable producer group and has been nominated by her community as member of the Board of Director of Farmer Producer Organisation in the state. She is cultivating vegetable in her 0.5 acre of land through Integrated Nutrient Management and Integrated Pest Management. She has also reported a 30% increased net return from vegetable farming through recommended package of practices learnt in training. Thanking Oxfam India and SEWA Bharat she told, "My increased income helped me in repairing my house and fulfilling the basic needs of my family." She also prepared a demonstration site at her farm to provide practical training to other women farmers in the previous year.

On 26th April 2018, Agriculture Production Commissioner, Government of Bihar awarded her as an '**Agent of Change**' appreciating her efforts in empowering women farmers.

But the accolades didn't stop here. On 27th May 2018, [Prabhat Khabar](#) (a leading print media agency) organized 'Aprajita Samman' (an award ceremony to recognize contribution of 14 women leaders in agriculture, health, sports, art, literature and social development sector) in Bhagalpur district. Kanchan was awarded for her contribution in incorporating the first women managed Farmer Producer Organisation.

She believes, "two years back, no one could have believed that we will write our own story in rural business and agriculture productivity enhancement through sustainable agricultural practices, but now people are recognising our initiative". Now Kanchan has paved the way for her community and other women farmers nationwide.

### **Conclusion**

Women's economic empowerment could reduce poverty for everyone. In order to achieve it, we need to first fix the current broken economic model which is undermining gender equality and causing extreme economic inequality. The neoliberal model has made it harder for women to have better quality and better paid jobs, address inequality in unpaid care work, and women's influence and decision-making power is constrained. To achieve women's economic empowerment, we need a human economy that works for women and men alike, and for everyone, not just the richest 1%.

## **MILLENNIUM DEVELOPMENT GOALS : INDIA'S HEADWAY TOWARDS ACHIEVING IT**

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### **Introduction**

The Millennium Development Goals (MDGs) which include eight goals were framed to address the world's major development challenges with health and its related areas as the prime focus. In India, considerable progress has been made in the field of basic universal education, gender equality in education, and global economic growth. However, there is slow progress in the improvement of health indicators related to mortality, morbidity, and various environmental factors contributing to poor health conditions. Even though the government has implemented a wide array of programs, policies, and various schemes to combat these health challenges, further intensification of efforts and redesigning of outreach strategies is needed to give momentum to the progress toward achievement of the MDGs.

### **What are the Millennium Development goals?**

The MDGs are a United Nations initiative that was adopted after the 2000 Millennium Summit. These represent a core people-oriented development agenda. They mapped out a plan to tackle, by 2015, many of the important issues facing the world. They are as follows:

- Goal 1** Eradicate extreme poverty and hunger
- Goal 2** Achieve universal primary education
- Goal 3** Promote gender equality and empower women
- Goal 4** Reduce child mortality
- Goal 5** Improve maternal health
- Goal 6** Combat HIV/AIDS, malaria, and other diseases
- Goal 7** Ensure environmental sustainability
- Goal 8** Develop a global partnership for development

### **India's overall performance on the MDGs**

The MDGs represent a core people-oriented development agenda. As a signatory to the historic Millennium Declaration adopted at the United Nations General Assembly in September 2000, India has remained committed to ending poverty and other deprivations. Achieving the MDGs is a core development challenge for India. India's new Government has reinforced this priority through the principle of Sabka Sath, Sabka Vikas and the Prime Minister, in his 2014 Independence Day speech, also urged Indians to work together towards overcoming poverty, gender inequality and the lack of sanitation, which are all crucial MDG tasks. India has made notable progress towards reaching the MDGs but achievement across the Goals varies. India has already achieved the target for reducing poverty by half (Goal 1) by official estimates – and is close to doing so by international estimates. India has already achieved gender parity in primary school enrolment (Goal 3) and is likely to reach parity in secondary and tertiary education also by 2015. India is set to achieve reducing hunger by half (Goal 1); to reduce maternal mortality by three quarters (Goal 5); control of the spread of deadly diseases such as HIV/AIDS, malaria and tuberculosis (Goal 6); has increased

forest cover and has halved the proportion of population without access to clean drinking water (Goal 7). But India is lagging behind on targets for achieving universal primary school enrolment and completion and achieving universal youth literacy by 2015 (Goal 2); empowering women through wage employment and political participation (Goal 3); reducing child and infant mortality (Goal 4); and improving access to adequate sanitation to eliminate open defecation (Goal 7).

India can improve performance by helping the weaker states emulate the good performers. The analysis finds that states that performed better on the MDGs focused on the following “drivers”: Accelerated broad-based and employment creating economic growth. Across states in India, economic growth is closely related to MDG performance. This is due to indirect impacts of growth on MDGs from governments’ expanding revenues; and direct impacts of growth from employment creation and increased incomes for poor households to invest in nutrition, health and education.

#### **Channelled resources into human development.**

Across India, states spending more on health and education in per capita terms have seen their human development surpass others. Promoted good governance and effective delivery of public services. States with better, more accountable and responsive service delivery have also performed better on the MDGs. For example, states that provided more work to the poor under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and provided more food grains for poor households from the Public Distribution System (PDS) also achieved better overall MDG performance scores. Extended basic infrastructure networks. States that have extended roads and transport and promoted access to electricity have seen more improvement in MDGs such as health and education than other states. States with better access to all-weather roads have a greater proportion of births attended by skilled health personnel. States with better access to electricity tend to perform better on literacy.

#### **Promoted gender equality and empowerment of women.**

It helps achieve the MDGs by reducing fertility, population growth, and child mortality; improves nutrition, hygiene and health of households, children’s performance in schools, allocation of household resources, and economic growth in general. States that have empowered women more than others — measured by the Gender Empowerment Measure (GEM) — have also performed better on the MDGs

Some of these overall “drivers” of MDG performance have been explicitly incorporated in the proposed sustainable development goals, such as inclusive growth, employment creation and infrastructure, recognizing their critical role.

#### **Main challenges for India in the Future**

Sixty-eight years after it gained independence, India is still engaged in a struggle for freedom from many deprivations: poverty, hunger, illiteracy, ill health, disease, and many others which the MDGs sought to overcome, but many remain unfulfilled. India’s achievement of the Sustainable Development Goals will require a focus on the acceleration of inclusive economic growth; guaranteed access to comprehensive social services; vast investment in basic infrastructure and women’s empowerment. On top of this, the formulation and implementation of effective and responsive development policies and programs are essential to fulfil development for all.

India will face major environmental challenges due to rapid urbanization. Air pollution in Indian cities with pollutants far exceeding norms is increasing. Cities also face other environment related problems such as excessive congestion, unhygienic conditions, poor waste disposal, and lack of green spaces for recreation. The pollution of its inland rivers and waters; depleting fresh water sources through melting of Himalayan glaciers and depleting groundwater; land degradation estimated at 20% of land area, and damage to coastal and marine ecosystems with loss of 34% of mangroves between 1950 and 2000, are other India's challenges.

However, as coal will continue to be a dominant source of energy for many years, access to advanced technologies such as carbon capture and storage would be critical. In this context, the government is putting heavy emphasis on renewable energy, and its plan to develop "100 Smart Cities" that are based on low carbon pathways is very timely and should be pursued vigorously.

Also, international partnerships with other emerging economies, such as the agreement provisions for transfer of technology (Trade-Related Aspects of Intellectual Property Rights TRIPS), or regional cooperation with other countries in South Asia are also of great importance.

### **Conclusion**

As the time frame set out for achieving the MDGs draws to a close, it is fitting to take stock. The Millennium Declaration and the MDGs it set out provided the world and India with a strong target-oriented agenda. In the midst of these developments, a new Government has assumed office in India, with a mandate for reform and faster development gains for all. It is an opportune moment to make an assessment of the distance covered and the much greater distance that is yet to be traversed; to take bold and corrective measures; and to secure the country's future with inclusive and sustainable development, as the world leaders adopt the new SDGs as a part of the post-2015 development agenda at the General Assembly in 2015.



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