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### **Sustainable Agricultural Practices in India.**

India is the third largest economy in the world with an ever growing GDP of 9.2%. This makes India, a country with the second fastest growing economy in the world, right behind China. The current Indian population as of July 2007 was 1,129,866,154. Because India has the second largest population, its per capita income is quite insignificant or minimal. Thus making India a low income economy. Indian population has always been a major issue along with problems like poverty, illiteracy and unemployment. Just as the Indian culture the economy is also diverse. It includes many different fields of work. However the field of Agriculture is where a majority of India's people make their living.

According to [www.bhookh.com/hunger\\_facts.php](http://www.bhookh.com/hunger_facts.php), One third of the worlds hungry live in India. The number of Hungry people in India is always more than the number of people below official poverty line. Eight Hundred and thirty six million Indians survive on less than half a dollar a day. Over twenty crore or two hundred million Indians will sleep hungry tonight. Over seven thousand Indians die from hunger every day. During the year of 2006, malnutrition contributed to seven million Indian children dying, nearly two million of them were under the age of one years old. The causes of poverty in India are do its high population growth rate, agrarian form of economy, primitive agricultural practices, illiteracy, ignorance, unemployment, underemployment, caste based politics, urban rural divide, social iniquity and discrimination.

Family life is equally varied in Indian states. India is a country with many states in which people from different cultures, religions, castes, etc. live. The language, clothing, customs, and traditions of people are influenced by the respective regions they reside in. The majority of the poor families live in simple huts or roofed houses. families often live in one room, all sleeping, eating, cooking in one small hut that does not keep out the monsoon weather or the heat of the equatorial sun. Children do not have adequate clothing or food. If they are going to school, often the meal provided for them there is the only food they will have for the day. Sometimes they will even bring home some of that food to share with their family. Finding any kind of Health care in India, for the poor, is fairly difficult. while finding any health care is difficult, doctors at health care clinics can be difficult to find as well. According to the recent National Rural Health Mission report, nearly 8% of the country's 22,669 primary health centers don't have a doctor while nearly 39% were running without a lab technician and 17.7% without a pharmacist.

Some education does exist for the poor in India. But the majority of the poor that go to school are male. Young women and girls in India face restrictions in their lives. when it comes to deciding what females can and cannot do, it is their male family members who acts as their keepers. The males decide weather the woman can go to school or if they stay home and keep the house. This has just been the way it has been for many years. Depending on location and circumstances the food availability can differentiate. Many have their own gardens or have markets nearby.

In India the techniques of traditional farming are often short in producing enough food for a well balanced diet. With the help of sustainable agriculture food security is improved by the quality and nutritional value of food. Often bigger ranges are produces with sustainable agriculture so there is more crops to produce throughout the year.

The growth of agricultural production and productivity, in India, had risen significantly during 1970s and 1980s, and declined during 1990s. These declines in agriculture production and productivity have gotten even worse since 2000, both agricultural production and food grains overall production have shown negative growth rates in 2000-01 to 2002-03 years. Decline in the growth rates of agricultural production and productivity is a serious issue considering the importance of food security, livelihood, and environment. As such, an examination of the different ways for sustainable agricultural development is necessary. This examination must be built not only by India's ongoing need to ensure food self-sufficiency but also by the consequences of the availability to the international markets.

Crop Rotation is a method of farming which avoids growing the same crop in a field continuously. Crop rotation can vary from rotating crops every two to three years or sometimes even longer. Every regular change of crops maintains soil fertility and reduces the risk of pests and diseases. Crop rotation is one of the oldest and most effective cultural control strategy.

Some advantages to crop rotation are:

1. Prevents soil depletion
2. Maintains soil fertility
3. Reduces soil erosion
4. Controls insect/mite pests. Crop rotation as a means to control insect pests is most effective when the pests are present before the crop is planted have no wide range of host crops; attack only annual/biennial crops; and do not have the ability to fly from one field to another.

Reduces reliance on synthetic chemicals

Reduces the pests' buildup

Reduces fertilizer needs

7. Prevents diseases

Helps control weeds

Improves overall long-term productivity of the land

The importance in crop rotation cannot be overemphasized especially when dealing with organic production. When selecting the rotating crops it takes more than just random choosing. The rotating crops must be of different crop families. Pests tend to feed on the same crop families. So if no rotation with another family of crops is made, then the pest will continue to feed on the crop. The soil and field are also considered when the selections are made. Rotation sequences should be designed to:

- reduce weed pressure by minimizing the amount of weed seed produced and reducing perennial weeds;
- increase the amount of mineralized nitrogen in the soil;
- reduce the incidence of insect and disease pests by eliminating hosts and interrupting pest life cycles.

This usually requires combinations or rotations of crops that attract or harbor different insects and diseases, fix nitrogen, inhibit weed growth, and enhance the soil.

Regardless of the political standpoint, environmental issues are becoming increasingly important to everybody for the rich to the poor. India as one of the largest agricultural countries, is no exception to this. The demand for chemical pest control, and receiving negative outcomes have expanded greatly during the last four decades. In recent past decades, intensive and invasive cultivation were done to high yielding crop varieties. They were then introduced to India to increase the production on food grain. The new crop varieties along with other things such as cropping sequences, mono cropping and use of different pesticides created many problems. Many minor pest species started to become major problems and began to cause economic loss. The

agrochemical industry in India now produced forty-seven thousand and twenty metric tons of pesticides in 2002. The pesticide consumption is surprisingly low compared to other countries such as Japan and Germany. But still India's problem from unregulated use of pesticides are very alarming. 61% of pesticides in India during the 2000-2001 year were insecticide. Following behind is fungicides with 19%, and herbicides with 17%. Most pesticide use was used on cotton with 45%, followed by rice with 22%.

According to [www.reference.com](http://www.reference.com), Integrated Pest Management (IPM) in agriculture, is a pest control strategy that uses an array of complementary methods: mechanical devices, physical devices, genetic, biological, legal, cultural management, and chemical management. These methods are done in three stages: prevention, observation, and intervention. It is an ecological approach with a main goal of significantly reducing or eliminating the use of pesticides. An IPM regime can be quite simple or sophisticated. Historically, the main focus of IPM programs was on agricultural insect pests. However, IPM programs encompass diseases, weeds, and any other pest that interferes with the management objectives of your site (agriculture, garden, structure, wild lands, etc.).

Integrated pest management is based around six basic components. They are Acceptable pest levels, preventive cultural practices, monitoring, mechanical controls, biological controls, and chemical controls.

Acceptable pest levels has an emphasis on control. Wiping out an entire population of pest is almost impossible and attempting to do so can be more costly, and environmentally unsafe. Instead deciding on what is an acceptable level and controlling that level.

Preventable cultural practices first off includes choosing the right varieties for the cultural growing conditions. Maintaining healthy crops, plant quarantine and cultural planting techniques are on the first line of defense.

Monitoring the select integrated pest management is the third basic component. The techniques used to measure used to monitor pest levels include visual inspection, insect and spore traps, and others. Along with monitoring record keeping is also an important aspect. It is important to know the pest's behaviors and reproductive cycles. Insects are cold blooded animals so their development is dependent on the temperature. So monitoring the degree of the day is beneficial to determine the optimal time of an outbreak of a specific insects outbreak.

If a certain pest were to get out of control the option most turn to first is mechanical methods. This includes anything from the simplest hand picking method to erecting insect barriers, using traps, and tillage to disrupt breeding.

With minimal environmental impact and at low costs, natural biological processes can provide significant control. With biological controls the main focus is on promoting beneficial insects that eat the harmful pests. Natural organic controls are the key in this situation.

The last basic component is chemical controls. Synthetic pesticides are used only when absolutely necessary. And if needed only in specific times in the target pest's life cycle. The more recent pesticides are more organic like and come from plant or natural occurring substances.

IPM can be used in many different types of agricultural planting. IPM is used often in organic farming (when you exclude the synthetic chemical option). When used in organic farming

reliance on knowledge, experience, observation, and integration of multiple techniques is crucial. For large, chemical-based farms, IPM can reduce the risk of exposure to hazardous chemicals to humans and the environment. Overall IPM may potentially lower the overall cost. With IPM another important component is the proper identification of the plant damage. What may look like a plant damage due to pests may be the problem of over-watering. Thus a spray may have been used needlessly and the plant still dies. When this occurs loss happens in both the plant and the spray.

To recent day, The successes of IPM practices have generated many benefits. Benefits includes:  
lower production costs

big savings for governments due to reduced pesticide imports and subsidies for pesticide use

reduces environmental pollution

improves soil and water qualities

reduced farmer and consumer risk due to the pesticides that could cause poisoning and other related hazards

ecological sustainability by conserving natural enemy species, biodiversity, and genetic diversity.

The reputation of a farming practice is essentially determined by the short term profitably. IMP endeavors to integrate available pest control methods to accomplish a farmer's most effective, economical, and sustainable combination for a specific local situation. Studies have been performed to analyze the pattern and profitability of IMP practices verse non – IMP farming practices. Studies of the cost and benefits of IPM generated farms and non- IPM farms with rice cultivation were done during the year of 2001. The study results showed that the IPM farms were more productive, resource efficient and profitable compared to the non-IPM farms.

The conditions for development of sustainable agriculture in India are becoming more and more favorable. New opportunities are opening the eyes of many in the field, such as farmers, development workers, researchers and policy makers. They are starting to see, and learn about the potential and importance of these practices not only for their direct economic interest but also as the basis of further intensification and ecological sustainability. They are learning that pesticides are dangerous to that health of humans and the ecology that surround. If pesticides are used, stored, or handled incorrectly chances of the pesticides leading to health and pollution problem are high. But the practice of sustainable agriculture reduces the need and use of harmful and dangerous chemicals. The practice controls pests with the use of the natural substances. These fact though does not mean that agrochemicals can be totally abandoned. Also, research has an important role to play. Bankers and funders should think of how best to provide incentives and credits, accessible to poor farmers and women, to make investments in dry land farming possible. As conditions for farming will always be changing and always continue to change, the key to sustainable agriculture is the ability of farmers and all other people or careers in agricultural development, as well as the society as a whole, to learn, experiment, adapt and cooperate in an effective way.

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