

Food Resources: Fertilizers -Pesticide problems Solution; Organic farming

Velagaleti Venkata Subbaiah

D-No:3-53,Chevitikallu,Kanchikacherla,Andhra Pradesh,India

Abstract:

Food refers to any substance that is ingested and is utilized by the body for growth and sustenance of life. In other words, natural or artificially produced materials that are used as food to derive metabolic energy are called food resources. Food is the ultimate source of metabolic energy required for growth, body repair, body heat balance, and daily activities. There is a wide gap between developed and developing countries about the production of food. In spite of several efforts, many countries of the world are still facing acute problems of food shortage and starvation. One of the factors that have been contributing to food problems these days, especially in developing countries, is the production of biofuels. It is been reported that the use of food crops, such as corn, to produce ethanol is driving up the prices of the corn, and the increased production of palm oil and soybean is leading to the destruction of large areas of rainforests. Global experts predict that to feed the world's growing population, some 500 million new acres of cropland will be needed by 2030, a 20% increase. Accumulation of water on the land for a long period is known as water logging. Rain, over-irrigation, and inadequate drainage cause excess water to accumulate in lowlands. Due to all these factors, moisture percolates down and dissolves the underground salts in it which come to the surface after the water evaporates.

Keywords: developing countries, natural, ethanol, food problems, etc.

Introduction:

Food refers to any substance that is ingested and is utilized by the body for growth and sustenance of life. In other words, natural or artificially produced materials that are used as food to derive metabolic energy are called food resources. Food is the ultimate source of metabolic energy required for growth, body repair, body heat balance, and daily activities. Primitive societies obtained food through hunting and gathering. Today human beings obtain food from cultivated plants and domesticated animals.

Types of Food resources:

There are three major sources of human food supply: crops, livestock, and fish. These are discussed in detail in the following subsections.

Crops:

All cereal-wheat, rice, barley, .etc – pulses, fruits, and vegetables are important sources of food. Although there are 250,000 species of plants, only 300 are grown as food, and only 100 are produced on a large-scale. Most of the world's food is provided by 20 crop species including wheat, corn, potato, banana, coconuts, etc.

Livestock:

Milk is obtained from milch cattle. Similarly, food items such as meat, eggs, honey, etc. are obtained from animals. Also, several bird species such as chicken are used as food material globally.

Fish:

A major part of the world's population depends on fish as a food source. Other aquatic organisms such as crabs, prawns, shrimps, etc. are eaten by some sections of the society. Artificial production of these may be done in a fresh water-based system (aquaculture) or marine water-based system (mariculture).

World food problems:

There is a wide gap between developed and developing countries about the production of food. In spite of several efforts, many countries of the world are still facing acute problems of food shortage and starvation. Some of the important problems are related to the food are:

- Lack of Irrigation Facility: Scarcity of water in some areas and improper irrigation techniques impede the production of food grains.

- Undernutrition and malnutrition: Both undernourishment and malnourishment are global problems. People may not die because of these, but they become less productive. According to an estimate, the food gap is widening in developing countries and one in four children will be malnourished worldwide in 2020.
- Hoarding and black marketing: Malpractices such as hoarding and black marketing creates an artificial scarcity of food and cause world food problems.

One of the factors that have been contributing to food problems these days, especially in developing countries, is the production of biofuels. It is been reported that the use of food crops, such as corn, to produce ethanol is driving up the prices of the corn, and the increased production of palm oil and soybean is leading to the destruction of large areas of rainforests. Global experts predict that to feed the world's growing population, some 500 million new acres of cropland will be needed by 2030, a 20% increase



Fig. Sources of food

Factors causing food problems:

The following factors contribute the food problems across the globe

- Geographical conditions: In many countries, geographical conditions do not favor agricultural yield.
- Population Growth: Food resources diminishing with the increase in population. Both population and food production has varied greatly, and on average, there has been no gain in the amount of food available per person. This trend supports the prediction

that at some point the growth of the population will outstrip the capacity of Earth to supply food.

- Natural hazards: Calamities such as floods, drought, earthquakes, storms, etc. damage agriculture large-scale.
- Inadequate distribution system: Today, there is enough food produced in the world to feed all the people.
- Social disruption and terrorism: Social disruption and terrorism have adversely affected the world food supply. For instance, social disruption in Africa during the 1960s severely affected agricultural productivity.

Today, more than 800 million people around the world face food shortages or malnutrition. The United States is a massive donor of food aid. It contributed more than half of all food aid required to meet urgent demands and respond to emergencies. Because of the rise in the costs of commodities and transportation, the US food aid programs have been stretched to the maximum limit and is feeding fewer people. In the last five years, the amount of food and delivery and declined by 43%, even while the number and frequency of food emergencies are growing.

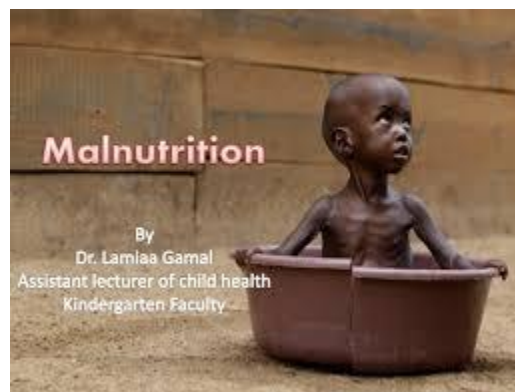
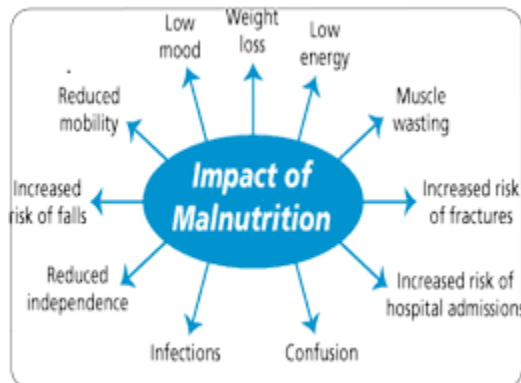


Fig. Malnutrition

Water logging and salinity:

Accumulation of water on the land for a long period is known as waterlogging. Rain, over-irrigation, and inadequate drainage cause excess water to accumulate in lowlands. Due to all these factors, moisture percolates down and dissolves the underground salts in it which come to the surface after the water evaporates. It makes the soil saline and alkaline. Such lands either converted into pasture land or are dominated by seasonal weeds. Regions enriched with canals and dams for irrigation are more prone to waterlogging which increases the accumulation of salt in the water-logged areas.

Effects of water logging:

Water logging has the following adverse effects on agricultural lands:

- It accelerates denitrification and causing loss of nitrogen. This makes the soil nitrogen deficient.
- It causes a lake of oxygen in the waterlogged areas.
- Due to low nitrogen and oxygen content, water-logged areas support the growth of only a few specific plant species.
- Water-logged areas support the growth of micro-organisms that cause rapid decomposition of accumulated organic matter. This leads to a foul odor.





Fig. Water Logging

Fertilizers-Pesticide problems:

Owing to the booming population across the world, there is tremendous pressure on the available agricultural resources to increase productivity. To overcome the limitations of the agricultural lands, nutrient-specific fertilizers are used depending on the variety of crops planted. To decrease the loss of the agricultural produce due to pests such as insects and rodents, various pesticides are also used. However, the excessive use of these fertilizers and pesticides can lead to a variety of environmental problems. Fertilizers and pesticides and problems related to their prolonged use are discussed in the following sections:

Fertilizers:

Fertilizers are used to increase the fertility of the soil by adding nutrients that help in plant growth. Fertilizers are of many different kinds and provide a variety of nutrients to the soil. They are divided into two broad groups- organic fertilizers and chemical fertilizers. Organic fertilizers are natural fertilizers, e.g., Cow dung and compost. They are made up of natural and biodegradable components. Chemical fertilizers are essentially chemically produced in factories and their prolonged usage can have a detrimental effect on soil health. The adverse effect of chemical fertilizers is as follows:

- Excessive use of chemical fertilizers leads to loss of soil fertility and degrades the soil quality.
- Chemical fertilizers create nitrate pollution in groundwater when they dissolve in water and seep into the soil.
- Excess fertilizers from agricultural fields find their way into ponds, lakes, and rivers through run-off from water from the fields. These run-off fertilizers speed

up the growth of algae in the pond, lake and river water. This phenomenon is known as eutrophication.

- The nitrogen fertilizers lead to the accumulation of nitrates in the soil when are then transferred to living organisms.

Pesticides:

Pesticides are used to kill certain species or to control the population of unwanted fungi, animals or plants that harm the crops, pesticides can be divided into several categories based on the kind of organisms that need to be controlled, e.g., insecticides, herbicides, and fungicides. Following are some of the harmful effects of using pesticides:

- Pesticides adversely affect other species such as frogs, snakes, and birds which are natural pests control mechanisms. They destroy earthworms which are highly beneficial to agriculture.
- The effectiveness of a pesticide is found to reduce when it is used for a long period. There is an increase in the resistance to pesticides in insects, pathogens, weeds, etc.
- Pesticides from agricultural lands run down with rainwater and enter local streams or lakes and adversely affect the health of farmers who use them.
- Pesticides are retained in the soil, concentrate on crops, vegetables, cereals, and fruits lead to biomagnifications, and enter the human body.
- Excessive use of pesticides causes the problems of air, water, and soil pollution.

Solution; Organic farming:

Organic farming is the form of agriculture that discourages the use of synthetic fertilizers and pesticides. In this, traditional techniques such as crop rotation, use of animal manure, etc. are used as far as possible to maintain soil productivity. Approximately 31 million hectares (75 million acres) of land worldwide are now cultivated using organic farming.

Modern agriculture:

The modern system of agriculture uses large amounts of fossil-fuels energy, excess water, chemical fertilizers, and pesticides to produce high quantities of crops or livestock. In modern agriculture the following scientific approaches are generally considered:

- Use of a high yielding variety of seeds.
- Use of chemical fertilizers.
- Protection of crops from pests by the use of pesticides.

- Modern irrigational practices.

The details of the effects of modern agriculture on the environment are discussed as follows:

Soil erosion and Loss of fertility:

Vast agricultural expansion has caused large-scale damage to natural vegetation and forests. Excessive plowing accelerates erosion due to wind and water. A low concentration of organic matter in the soil further accelerates soil erosion. The use of modern, heavy machines increases soil compactness, which adversely affects soil fertility and other soil qualities.

Sedimentation:

Increased soil erosion adds a huge amount of sediments in lakes, ponds, and rivers. Excessive sedimentation degrades water quality, reduces the depth of the water body, affects fisheries and accelerates the loss of biodiversity.

Change in land-use patterns:

Modern agriculture has led to an increase in the area under wheat and rice cultivation, while there is a decrease in the area under pulses. Wheat and rice are considered as soil-depleting crops. While pulses are considered as soil-nourishing crops. Reducing the cultivation of leguminous crops means depriving the soil of natural fertilizing agents. Repeated cultivation of wheat and rice crops means draining the soil of nutrients.

Fertilizer problems:

Excessive use of chemical fertilizers has a detrimental effect on soil health. The introduction of untreated or partially treated sewage into a water body could lead to an increase in the amount of organic matter in it. The decaying organic matter provides nutrients for the growth of algae and other aquatic plants. The accumulation of excess nutrients is called eutrophication. Eutrophication also occurs when excess fertilizer nutrients (mainly nitrogen and phosphorous) accumulate in the water body. It usually results in an overgrowth of phytoplankton (small plant algae). Once these die, they begin to decompose. The decomposition causes depletion of dissolved oxygen, which is very important for the life of fish and other aquatic life. This may ultimately lead to the death of fish and other aquatic organisms due to suffocation.

Pesticide problems:

Excessive use of pesticides causes the problems of air, water, and soil pollution. Pesticides gain access to the human body through grains, vegetables, fruits, fish, etc., and cause a variety of adverse health effects.

Irrigation-related problems:

Modern agriculture has increased the need for irrigation water at two levels. First, it has prompted a shift away from crops that require less water, such as millets and oilseeds, to monocultures and multi-cropping of wheat and rice, which require water inputs throughout the year. Second, modern crop varieties need much water than indigenous varieties. Irrigation without proper consideration for the drainage of excess water can be dangerous. The land gets waterlogged when the water table is about 105 to 2.1 m below the ground surface. The water table rises if the water is added at a rate greater than the rate at which it can drain out. Water-logging is associated with another problem- salinization; salinization diminishes the productivity of the soil and ruins it forever.

Problems due to agricultural animals:

Overgrazing by agricultural animals increases soil erosion. Due to overgrazing, important portable plant species are replaced by spiny and non-palatable alien species.

Climate change:

Several agricultural activities add a sizable amount of CO₂ into the atmosphere which increases the global temperature through the enhanced greenhouse effect. Along with this, deforestation due to agricultural expansion, burning of fossil fuel for operating agricultural machines, burning of weeds, etc., are some of the agricultural activities responsible for climate change.

Effect on Biogeochemical cycles:

The use of fertilizers, deforestation, rapid soil erosion, etc., adversely affect the biogeochemical cycles.

Loss of Genetic Diversity:

Traditional agricultural systems encourage diversity in crop breeds; modern agriculture encourages monocultures of crops and single varieties to maximize grain production.

Intensification of Inequality:

The poor farmers cannot afford to purchase new seeds and more fertilizers and pesticides from the market. Traditionally, access to all these was free or they were available at prices affordable by most farmers. As a result of modern agriculture, existing inequalities grow.

Conclusion:

Processing of foods involves loss of nutrients. Staple foods are fortified, by governments or other bodies, with the thing of overcoming endemic nutritional diseases or as a prophylactic measure. Manufactured commodity also is fortified with nutrients, either with the thing of ensuring the nutritional adequacy of the merchandise or to realize better sales. In India several such schemes are tried with more or less success. Fortification when undertaken has got to be supported an in depth study of the necessity, and therefore the mode of fortification. Economics, consumer acceptability, and means of achieving the objective should be the guidelines for such projects.

References:

- Microbiology and Technology of Fermented Foods (Institute of Food Technologists Series) by Robert W. Hutkins | Nov 20, 2018
- Food Processing Technology: Principles and Practice (Woodhead Publishing Series in Food Science, Technology and Nutrition) by P J Fellows | Oct 10, 2016
- Food Science and Technology by Geoffrey Campbell-Platt | Nov 29, 2017
- The Craft Brewing Handbook: A Practical Guide to Running a Successful Craft Brewery (Woodhead Publishing Series in Food Science, Technology and Nutrition) by Chris Smart | Nov 13, 2019