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## THE COUNTRY OF IRAN

The Islamic Republic of Iran, with 1,648,195 square kilometres area is located in north eastern hemisphere between 25.3 to 39.47 latitude and 44.5 to 63.8 longitude in the Asia continent. At present, the population of Iran is about 65 million with a growth rate of 2.8%.

The maximum and minimum annual rainfall in humid and dry regions of the country are 2000 and 30mm respectively, with the total annual mean of 270 mm for the country. Almost 12.3 million hectares, which accounts for 7.48% of the total area of the country are cultivated and considering the diversity in the climatic condition, production of many different agronomic and horticultural products is plausible. In 1999, the total agricultural produce was about 61 million tons, including 48.5 & 12.5 million tons of agronomic and horticultural produce respectively.

Also in the same year, the mean production of red meat, poultry, eggs and milk have been reported as 721, 725, 570 and 5564 thousand tones respectively, Furthermore, the production in Fisheries sector has increased from 1000 tones in 1980 to 400,000 tones in 1998.

## INTRODUCTION

Subject of health and sufficient food for all individuals, in another word, “food security” has become the top priority and issue because of the ever-growing population of the world, food shortage, and limited supply of resources. According to the international organizations report like FAO and WHO, this case is considered a problem when nearly 25% of the produced food is destroyed by degradation, especially microbial degradation and will not reach the consumers. Apart from safety problems, it imposes severe economic burdens on the countries and producers.

Besides, increase in the urban population and reduction in rural community has caused fundamental changes in food consumption pattern, processing and hazards. Not very far in the past, factors like bacteria, parasites and viruses were the most biological important causal agents of diseases and illness in humans consuming contaminated food. Although, these organisms still play major role in creating health problems in consumers, the new hazards like veterinary drug residues, pesticides and other chemicals like heavy metals and other environmental contaminating agents are also additional pollutants which are as important as biological factors. Mentioning that and considering the food safety, observing hygiene along the line of production to consumption chain is vital and needs renewal of outlook from government agents, producers and industries.

According to the study and reports made by World Health Organization and Food Agriculture Organization of the United Nations, illness due to contaminated food is one of the most widespread health problem in the world and an important cause of reduced economic productivity specially in developing and under developed countries. To achieve the goal of “access to nutritionally adequate and safe food is a right of each individual”; food safety must be given higher priority by all governments. Currently, thousands of people worldwide are suffering from diseases caused by contaminated food, which inflicts a heavy social and economic despair. The rate of incidence of food borne diseases differs in different parts of the world, in the industrial countries many such malady do not exist or have been halted due to food safety education, higher standards of hygiene, improved water supplies and sanitation, and application of safe food processing technologies. However, despite these measures, between, 5-19% of the population in industrial countries are being affected by food borne diseases.

Epidemic of diseases caused by foodborne pathogens such as *E. coli* and *Ampylobacter jejuni* in Australia, Japan, Europe and the United States of America, claims thousands of victims and causes many deaths.

New chemical hazards in food with the potential to affect human health are continuously being identified. In addition to the sickness and death by food borne diseases, diarrhoea is the root cause of malnutrition in developing countries, which has immense consequences on the growth and resistance of people to diseases. Every year, between 12 to 13 million children die from combined effects of malnutrition and infection.

Food chemical hazards remain a worldwide concern with implications for both health and trade. In the industrial countries, most hazardous chemical in the food appears to be under control, although exposure to certain contaminants, such as lead, poses risks to certain groups like children. In most developing countries, lack of monitoring systems does not allow a direct assessment of the health impact of chemical contamination; outbreaks of acute poisoning are frequently reported, therefore suggesting that such contamination maybe a significant public health issue in these countries. Health is a crucial factor in economic development. Undoubtedly, foodborne diseases impose economic costs on communities, industries, health care systems and nations. It is estimated that nearly 2-3% of food borne diseases lead to long-term ill health, which has impacts beyond the damages to public health and the economy and cause damages to the development of a country in such a way that each year, huge sums are spent of medical care, and absentees from work. Also, unsafe food products are rejected in importing countries on health grounds, with obvious economic consequences and for exporting countries.

As already mentioned, food safety is viewed as an essential public health issue of increasing importance, therefore for the well being of the society, all the governmental and non-governmental agencies should assume responsibility for production of safe and health food

## **FOOD SAFETY IN IRAN**

### **1- PESTICIDE RESIDUE**

The history of using plant and chemical products as pesticides dates back to 100 B.C. It is interesting that there were very few pesticides available before 1930, many new chemical compounds were made during 1930 by the help of synthetic chemistry and since then their number have increased to thousands.

Pesticides are categorized into 3 groups of insecticides, herbicides and fungicides with insecticides having the highest health risk, by affecting nervous system of the target pests.

Currently, about 2.5 million tons of pesticides are being used worldwide, that is 0,45 kg per person. Nearly, 85% of pesticides are applied tin developed countries, but the scope of application is gradually rising in developing nations and the incidence of toxicosis is reported to be 13 times more in developing that the developed countries. According to the World Health Organization report, the incidental toxicosis has increased due to consumption of pesticides from half a million cases in 1972 to 1 million in 1985, of which 20,000 have lost their lives.

Transportation through food chain is one of the most important side effects of pesticides. Pesticides can inflict acute diseases in people who may have accidental contact with airborne drops, contaminated vegetable or food, and/or during application of chemicals. This phenomenon can in some stage enter and damage vital physiological reactions and chromosomes, inducing genetic malfunction and/or increase cell multiplication rate and cause cancer. To promote human health and safety, Codex Alimentarius Committee appointed by WHO and FAO began developing international food safety standards on pesticides (MRL) in 1962.

#### ***1.1- Summary of main activities in Iran***

To combat plant pests and diseases nearly 25,000 tons of pesticides are being applied annually in Iran.

To compete in international markets, Iran intends to standardize and support puts exportation of products. Like in many other countries, development of food safety standards is handled by governmental bodies such as Ministries of Agriculture, Health, hygiene and Medical Education, Institute of Standards and Industrial Research ... In the mean time research continues on the promotion of national food safety quality.

Research activities began on pesticide residue control sine 1969, and because of the importance of maximum residues limits (MRL) in different agricultural products, study continued on evaluation of pre harvest of highly used pesticides.

The major related work accomplished is:

- Development of maximum residue limits (MRL) for different products according to the codex norms, before establishment of permanent national MRL.
- Estimating pesticide residue in agricultural soils.
- Measuring and comparing residue of 19 organophosphorus and nitrogenous pesticides in rivers of Iran with EPA standards.
- Evaluation of pesticide residues and preharvest intervals in different yields and stored products.
- Pesticide residue control in marketed agricultural products with emphasize on vegetables.
- Development of national MRL and report on preharvest intervals for registered pesticides in the country.
- Investigations the probable presence of pesticide residues in exported commodities.
- Monitoring the possible presence of organophosphorus pesticides in breads in Tehran bakeries.
- Heavy metal residue determination in refined edible oils and highly consumed varieties of fishes in Caspian Sea.
- Examining heavy metal residue in soil and water
- Further investigations were made on health and food consumption.
- Evaluating degree of food basket in Iran.
- Monitoring nutritional status and nutritional key elements in food basket in Iran
- Comparisons of food basket quality in major cities and rural setting.
- Assessing food wastes and causing elements
- Issuing safety licenses, paying technical and safety control visits to food centres and stores, preparing regulation drafts for, food, drinks, cosmetics, hygiene and further organizing meetings of food policy committee, and baby's milk and food council.
- Organizing meeting to reduce the problems faced by different industries like meat products, syndicates, cosmetics and hygiene, bread and flour industry, canned food industry, etc.
- Management and control

Use of pesticides is inevitable for prevention of pest damage and increase agricultural products. The main concern is training of formers for correct and safe handling of pesticides and for production of safe and pesticide free yields. To achieve this objective the role of governments, organizations related bodies is vital and of great importance. To tackle the issues of hunger, and chemical hazards, each country must have a national food safety programme with an efficient coordinator to harmonize the functions of research and administration sectors with the extension councils and farmers.

To combat obstacles in food production and to promote agricultural sector, economic, social and political policies concerning tariffs, investment in rural sector, credits, efficient trade legislation's, property rights and social welfare should be given high priority. Furthermore, on farm training would enable farmers to enhance their awareness while performing their work, and this would inspire a better working atmosphere between extension expertise and research committee. Proper instructions to farmers on efficient use of pesticides and convincing them that production of pesticide free products means more yields and demands and therefore a better return of their investment are also other strategies. In addition, investments in infrastructure sector and marketing services when assumed according to local priorities are important when undertaken by government and non-government sectors. Of course the role of private institutes and universities should be underestimated in shared research and education programmes.

## 2- MYCOTOXINS

Mycotoxins are one of the contaminants of food materials, which jeopardize food safety. Mycotoxins like deoxynivalenol, aflatoxin, fumonisin and zearalenone have immunodepressive properties and their carcinogenic risk is more than other synthetic chemicals, they also cause other chronic and acute diseases in humans.

### 2.1- Summary of major activities done in Iran

In Iran, the work began on mycotoxins especially aflatoxins on pistachio in 1971. Following that, mycotoxins center was established and research projects were followed on different aspects of detection, critical control point in toxin production, prevention and detoxification of mycotoxins particularly aflatoxin in agricultural products. Other evaluated mycotoxins are zearalenone, fumonisin, deoxynivalenol, ochratoxin and patulin. Of other interesting activities is development of national standards on mycotoxins residue levels in different products, which is at final stage of approval

*Table 1. Mycotoxin detection in various food products*

Mycotoxin compound	Foodstuffs
aflatoxin	dry fruits, legumes, cereals, cattle feedstuffs
ochratoxin	dry fruits, legumes, cereals, cattle food, baby food
Zearalenone	cereals
Deoxynivalenol	wheat, cereals, animal feed
Fumosinin	corn
Patulin	fruit juice, baby food
Aflatoxin	milk and dairy products, baby milk powder
T2-toxin	animal feed

### 2.2- Prevention and control of mycotoxins

Management strategies in preventing and controlling mycotoxins are integrated are integrated measures applied before and after toxin production. It is important that mycotoxin detection methods should be totally specific and very productible.

Contamination to mycotoxins is quite possible at pre and/or post harvest stages. To avoid toxin production at the pre-harvest stage some essential steps should be taken such as proper and on time irrigation and harvest, Pest control, biological control, use of resistant cultivars, and finally precise assessment methods for detecting the right time and place of toxin production. For preventing toxin production at post harvest, well drying of target crops and prevention of humidity caused by natural or unnatural factors like rain or accumulation of crop before or after drying and use of standard aerated warehouses are recommended. In case of contamination particularly for animal feed, detoxification by chemical means such as ammonia is recommended, so adding chemical substances frequently to animal feed would eventually diminish the toxin.

Use of Gamma radiation can be used for detecting mycotoxin in some products, it inhibit the growth and sporulation of some toxin producing fungi.

Currently in Iran, aflatoxin detection is performed on exported pistachio only, and exportation would be prevented if toxin level exceeds the required level of customer country.

### 3- FERTILIZERS

#### 3.1-Summary of research undertaken

Investigation on reduction of residue of some pesticides like diazinone and phosalone in apple using calcium chloride which further protects the yield during storage period in cold storage. Application of micronutrients, zinc, magnesium sulphate for promoting quality and quantity of agricultural commodities especially cereals.

Study of interaction of zinc and potassium, nitrogen and potassium, and salinity on quality and quantity of fields.

Executing research concerning efficient use of potassium, as an essential nutrient for all living organisms and its role in most [plant physiological and biochemical functions, crop quality and also enhancing crop resistance to pests, drought and frost.

### 4- HEAVY METALS

Food contamination by heavy metals in Iran.

The environment has been threatened since the start of industrialization in Iran especially by petrochemical and steel mill industry, oil refinery products and industrial sewage. There are some investigations carried out on heavy metals contamination in different environments which can be summarized as:

Detection of mercury, cadmium, lead, nickel, Chromium, silver and so on in some rivers, wells underground waters, drinking waters, and soil and agricultural fields.

### 5- ANIMAL PRODUCTS

Important activities performed by **Iran Veterinary Organization (I.V.O)**.

- Hygienic control of animal farms like aquaculture centres;
- Hygienic control of factories producing animal, poultry and fish feed: feed hygiene control is the first step in preventing the transfer of common diseases of human and animals.
- Hygienic control of animals in farms: checking and testing farm animals and livestock's are of the duties of IVO and in case of encountering with dangerous cases like tuberculosis and brucellosis, the infected animals would be properly destroyed.
- Hygienic control and supervision on use of veterinary drugs: to prevent the build up of the residue of veterinary drugs in meat products, IVO supervises veterinary drugs consumption and the withdrawal period before the slaughter takes place.
- Hygienic control and supervision over transportation of livestock and their products: To stop the illegal transportation of livestock and their products, which might incur high risks, IVO has installed quarantine stations across the country and also at the borders.
- Hygienic control and supervision of slaughter houses and processing and packaging establishments of raw animal products: IVO has appointed health inspectors in slaughter houses and/or processing and packaging establishments of raw animal products to control all stages of meat processing and packaging. Further more, all of these establishments would be designed and built according to norms of good manufacturing practices scheme (GMP). Also by implementing the HACCP system (Hazard Analysis and critical control point) in food of animal origin processing and packaging establishments control is obtained over all stages and by preventing the incidence of health hazards for consumers the community's health and security is guaranteed.
- Hygienic control and supervision over food of animal origin in market places: IVO is in charge of supervision for all market places of food of animal origin like butcheries, poultry markets, fish mongers and its health inspectors supervise the supply quality by their frequent visits. To ensure the food safety and security, IVO also endeavours the task of quality assurance all along the production line from field to consumers home, some of which are equipped with international standards like EN45001.

- - Conducting regular training courses for its health inspectors and other related personnel.

Adjustment of fish processing plants with international hygienic standards, proving the implementation proposal of international standards in animal products. In a 4-year plan, the IVO intends to establish a reference laboratory. According to international standards (EN 45001), which could control the veterinary drug residue and other contaminants in animal products. One of the other aims of this plan is to apply HACCP system along the line of production to consumption chain of raw animal foodstuffs. This plan worked well in fish processing plants and succeeded in exporting products and gaining international attention, therefore it was decided to employ the HACCP system to other animal commodities too. In the 4 year plan the system will be exercised in slaughter houses, food of animal origin packaging establishments, milk collection centres and..... Furthermore, a joint project has been set up between IVO and FAO for veterinary drugs and pesticides residue management. IVO will benefit from technical and logistic support of FAO.

## **6- STANDARDS**

The institute of Standards and Industrial Research of Iran was established in 1960, some of its responsibilities are:

1. defining, developing and publishing national standards as the sole official reference in the country;
2. promoting national standards;
3. supervising on compulsory standards.

Food, agriculture, microbiology and biotechnology are the most active managements of the institute with 18 laboratories and 100 personnel.

In addition, further food and microbiology laboratories are scattered across 28 provinces in the country.

Food management division supervises laboratories of sugar, cans, drinks and additives, cereals, nuts and dry fruits, meat products, animal and poultry feeds, oils, fats and dairy products. Microbiological management division controls the laboratories of meat products, dairy products, canned foods and cans, cereals, confectioneries, hygiene and medical equipment, drinks.