Indigenous Liquid Fertilizer Machine

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Introduction:

Water soluble fertilizer has higher uptake efficiency than conventional fertilizers and are recommended for better crop production. Most of the water soluble fertilizers are being imported from foreign countries to Pakistan; that's why, their market price is too high. To reduce the cost of liquid fertilizer, there is need to manufacture these fertilizers indigenously. Some local industry personnel are manufacturing liquid fertilizer by using improper machinery without any safety measures that is very dangerous and can cause serious accidents. The proper fertilizer machines of imported brands are expensive because these machines are not available in local market. To promote the use of liquid fertilizer, there is need to manufacture these fertilizers on large scale by local investors by using cheap fertilizer machines. To address this problem, an indigenous liquid fertilizer machine has been developed by WMRC for efficient production of liquid fertilizer products.

Indigenous Liquid Fertilizer Machine:

The Indigenous Liquid Fertilizer Machine has been developed by reverse engineering of Imported Liquid Fertilizer Machine to reduce the cost of fertilizer unit. The price of indigenously developed machine is less than the half price of imported machine of same specifications.

Features:

- Simple in structure
- Simple feeding and collection mechanism
- Mixing amount is large and product can be manufactured on large scale
- Easy to operate and easy to maintain
- Reduce the requirement of manpower
- Low cost as compare to imported machines
- Low energy consumption
- After reverse engineering, the machine can be manufactured in variety of sizes as per demand of manufacturing product

Specifications:

The specifications of Fertilizer machine, installed at Water Management Research Centre, University of Agriculture, Faisalabad are as: Total capacity: 1.2 m^3, Effective capacity: 1 m^3, Storage tanks for product and raw material: 4 Nos (1 m^3 each), Reactor agitator: 70-100 RPM, Construction material: SS316L, Cooling System: Out site coil with 5 Lpm water flow, Metering pump: 500-1000 L/hr

Fruits and vegetables the potential source of probiotic bacteria

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Probiotics are live health promoting beneficial microorganisms which boost up the immune system of the host when consumed in appropriate amount. People mostly think that bacteria and other microorganisms are harmful, but many are actually beneficial. These beneficial microbes help in the digestion of food, destroy cancer-causing cells, suppress the serum cholesterol level, produce vitamins, stabilize the gut micro flora, stimulate the immune system and reduce the gastrointestinal and urogenital tract infection. *Lactobacillus* and *Bifidobacterium* are the most common genus of bacteria found in a variety of fruit and vegetables. *Lactobacillus* isolated from fruits and vegetables involve in the treatment of diarrhea, urinary tract infections and immune system modulations. Probiotic bacteria involve in immune system modulation and ultimately improve resistance to allergies, stimulate innate immunity and prevent respiratory diseases. They also produce some anti-carcinogens, which suppress the growth of tumor cells and cause the destruction of carcinogens released by pathogenic bacteria. Enzymes produced by *Lactobacillus* involve in the reduction of lactose in milk and allow the consumption of milk by lactose intolerant people. These probiotic bacteria produce some compounds (lactic acid, acetic acid, and bacteriocin) which inhibit the growth of harmful bacteria. The important property of probiotic bacteria is that, they maintain the microbial balance in body, which is disturbed by taking antibiotics. Antibiotics kill the beneficial bacteria along with harmful ones and leading cramping, gas and diarrhea. Protein and fat in the digestive tract is breakdown by probiotics bacteria, which is very helpful for infants and patients to build strength after illness. Although milk is good source of probiotic bacteria, but it is necessary to have some alternatives that do not contain milk to meet the need of those who are lactose intolerant. So, fruits and vegetables are good source of these beneficial microbes. These probiotic bacteria enter into fruits and vegetables through pores and cracks. They are present in banana, apple, orange, mango, peach, cucumber, tomato, sweet potato, cabbage, garlic and ginger etc. Minerals, sugar and vitamin present in fruits and vegetables promote the growth of these bacteria. To reduce the risk of heart diseases and hypertension many scientific studies suggest the consumption of fruits and vegetables. Almost 90 probiotic products are available worldwide.

Food borne illness: A major threat

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Introduction:

People getting sick of something they eat. Now a days, food poisoning is a major threat, also known as food borne illness that occurs due to consumption of food. Many different disease causing microbes or pathogen can contaminate foods. Most of the food borne infections or illness caused by bacteria, viruses, and parasites. The People which included pregnant women, young childerns, older adults and the people who have a weaker immune system are at high risk. *Bacillus cereus* is one of the bacteria that are involved in foodborne illness. It is commonly present in the environment, so it is easily spread to many types of fresh and processed food products.

When it comes to foodborne illness most of us think about undercooked meat and eggs but raw fruits and vegetables, contaminated water, sea food, unpasteurized dairy products, canned food, ready to eat food can also cause foodborne illness. Unhygienic food handling and improper storage is the main cause of food borne illness. Symptoms often include fever, vomiting, aches, stomach cramps, and may include diarrhea. In any household, their first priority is to keeping the family safe. Food borne illness is entirely preventable, so by following some precautionary measures we can protect our family from food borne illness.

Good hygienic practice must adopt before and after food preparation, it can minimize the chances of getting an illness. Washing hands with warm/ cold water or soap for 20sec, is one of the effective protection method against food borne illness. Ready to eat food must be store separately from raw food. Keep hot foods above 57 ℃ and cold foods below 5 ℃ to prevent the contamination of *B. cereus* in the food. Cooked food should not be left at room temperature for more than 2 hours. Wash fruits and vegetables thoroughly before cutting and cooking. The simplest way to avoid the *B. cereus* food borne illness is that foods should be cooked thoroughly and cooled rapidly. By following these preventive measures, we can keep the food safe and protect ourselves from food borne illness.

If you become ill and the symptoms of illness are severe then you should have to consult the doctor immediately.

Gamma Irradiation: A Tool to Improve Citrus Genome

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Citrus industry is the major fruit industry all over the world. In Pakistan, citrus is also one of the major fruit crop. It is grown in all provinces, however the contribution of Punjab province is more than 95% for producing good quality citrus. Genus Citrus includes oranges, grapefruit, lime and lemons, pomelos.

Grapefruit is commonly known as forbidden crop has great nutritional value. In 2019, world production of grapefruits (combined with pomelos) was 9.3 million tonnes, of which 53% was in China. Other significant producers include United States, Vietnam, and Mexico. Figure below shows the world leading grapefruit courting.

Grapefruit is good source of vitamins, iron, calcium and other minerals. Pink and red flesh varieties have beta carotenoids which are the good precursor of vitamin A. Juice of grapefruit provides less calories and helpful to overcome obesity. Bioflavonoids and other plant chemicals are also present in juice of fruit which protect the body against cancer and prevents heart related disease. Antioxidants which are present in fruit improve the immunity of body against harmful bacteria and viruses.

Grapefruit is a polyembryonic by nature. It was introduced in early 19^{th} century to Florida. Grapefruit comprises number of varieties which are white and pink fleshed varieties. Among all the varieties, Duncan is said to be the oldest white fleshed variety. Above 70% pigmented varieties are grown in Texas. Almost 59% pink and red varieties are commercially propagated in Florida whereas in Argentina 94% grapefruits are pink and red fleshed varieties.

Application of gamma irradiation in the field of breeding has opened new gateway for enhancing and improving the germplasm of agronomic as well horticultural crops. Breeders are using this technique to cause mutation to get the desired characteristics. This technique is used to induce different biological phenomenon for inhibiting the morphological traits. It is widely

used in citrus fruit to get seedless plants like kinnow and mandarin. Gamma irradiation in grapefruit helps to enhance fruit quality such as pollen germination, improving bearing habit of fruits, blooming and fruit repining time, weight, size and maturity index, bio-molecules, self-incompatibility, and resistivity against pathogens etc.

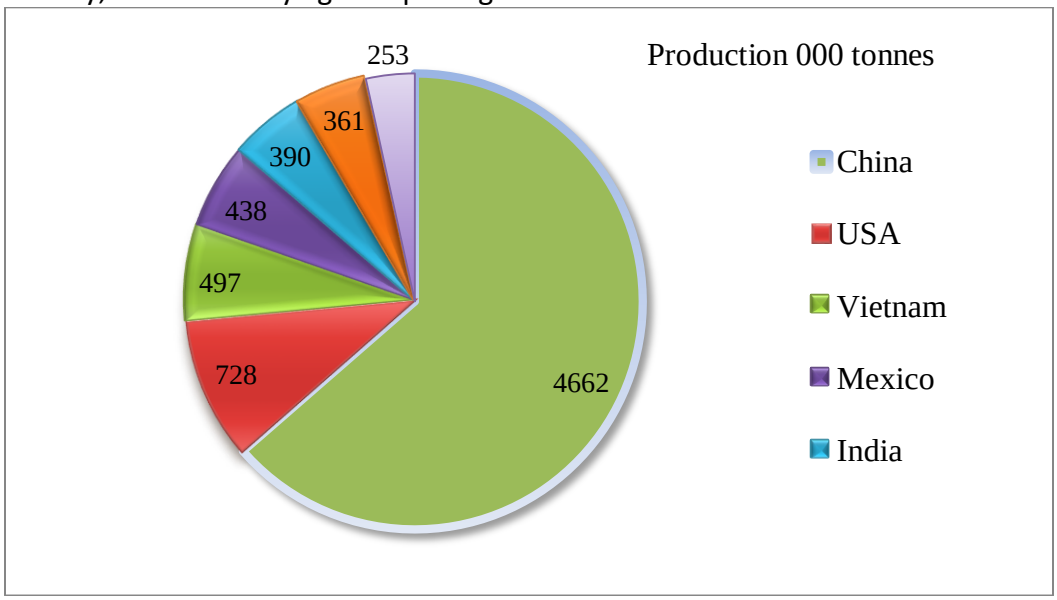

Fig. 1: World leading grapefruit countries.

Mutation breeding is a great tool used for enhancing the germplasm. Mutation may be spontaneous or induced. Different mutagens are being in practice for plant breeding programs. This induced mutation is used for improving tolerance of plant varieties and quality of fruits. On large scales, genetically modified organisms (GMOs) are the results of these induced breeding programs. A variety of chemicals are available which are used as mutagens but gamma rays and X- rays are more frequently used for inducing mutation as compared to chemical mutagens

Application of gamma irradiation is successful technique for obtaining new and seedless varieties like oranges, grapefruits lemon and mandarin. Gamma irradiation is mostly applied on budwood, but it is also adopted in seeds and pollens. The dose will definitely reduce as the nature plant cell/tissue organ. So depending on the species and varieties, acute range of radio sensitivity (LD_{50}) is mostly used from 40-100 Gy. Star Ruby was first released as the result of exposure of *Citrus paradise* cv Hudson with thermal neutron. Similarly complete seedless variety Eureka was also obtained with the exposure of gamma radiation.

Gamma rays can create permanent gene expression of anti-oxidative enzymes against oxidative stress. This provides superior plant varieties having tolerance against biotic and abiotic stresses. According to literature, increased application of gamma irradiation may induce different enzymes like SOD, POD, APX and CAT. Defense mechanism of plant also change which produce qualitative and quantitative plant proteins of irradiated plant species.

As the world population is increasing so fast since last five decades and it is estimated that it's population would be more 34% as today, in 2050. Urbanization and colonial development has limited the agricultural land area. Food security, economical and easily accessible to food would be the main issue of under developed countries. Induced mutation through gamma irradiation has played important and vital role for increasing world food security with new more tolerant and better yielding and good quality varieties. Production of reactive oxygen species (ROS) also help to increase plant cells which may cause oxidative stresses.