Potato and wheat pests and diseases
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Doctorate in plant diseases

Host: Dear listeners, we welcome you from every corner, especially from the lands of beloved Syria. We also welcome Dr. Khaled Al-Hassan, who holds a doctorate in plant diseases, from the University of Ain Shams, Egypt.
Today, we will be addressing the most important scourges and diseases of the wheat and potato crop in Syria, as well as comprehensive control programs for these diseases and pests.
In brief, what is the significance of wheat and potatoes as food crops?

Presenter: Wheat and potatoes are among the world's top food crops, with wheat ranking first and potatoes fourth only behind maize and rice.
The growing demand for food as a result of the growing population of the land is putting increasing pressure on agriculture and natural resources. Today's food systems do not provide a healthy and sustainable nutrition for the entire world population, with some 800 million people undernourished.
In 2018, a report by the Food and Agriculture Organization (FAO) stated: By 2050, the world's 9.7 billion people will need 70% more food than is consumed today, hence the importance of wheat and potatoes as important food crops worldwide
In Syria, wheat and potatoes are also an important food crop and have a major role in the food security of Syrian citizens. A meal of bread or potatoes is not free, and they are a good source of income for a large percentage of rural families.
The protracted crisis in Syria has added to the many restrictions on the agricultural sector in general and on the production of food crops in particular, such as the lack of quantity and quality of agricultural inputs, the high price of these inputs, and the absence of agricultural extension services, the high cost of services and irrigation as a result of the high cost of fuel and the latest of these long-standing constraints.
wheat crop

Host: What are the most important diseases affecting the wheat crop and which have a significant impact on production?

Presenter: During the period of its development, wheat is exposed to a number of diseases that affect the quantity and quality of production. Among these diseases is rust diseases.
Three types of echoes of wheat are produced by three types of puccinia mushrooms:
Yellowish rust or striped rust — stun or black rust — crust of leaves or brown rust.
These diseases are destructive to the wheat crop and are major vital impediments to efforts to maintain wheat production worldwide.
Puccinia striiformis, the most important and dangerous disease in wheat, is the Yellow Rust Disease (Planned), one of the most destructive of wheat production in many countries of the world, thanks to the ability of the pathogen to develop rapidly, give new strains, and spread over long distances through the wind. The disease causes worldwide economic losses ranging from 40 - 60% to 100% if the disease occurs under ideal conditions of spreading from heat and humidity to disease. The disease is spread in more than 60 countries on five continents, and China is one of the countries most affected by the disease.

In Syria, yellow rust is one of the most important diseases of wheat, especially in soft wheat. It causes serious damage due to its early appearance in the growing season for wheat plants compared to the other two types of rust. It is spreading throughout the wheat-growing regions of Syria, and the most severe epidemiological outbreak of this disease was in the 2010 season. Most of the approved varieties of soft wheat (Sham 8, Sham 10, Sham 6, Sham 4, Golan 2, Research 8) were susceptible and the most susceptible was Sham 10.
The disease infects wheat plants in relatively cold, high-humidity environments. Temperature plays an important role in the incidence and development of the disease. The rust is characterized by temperatures of 10 to 15 m ± 2°C, and the wide difference between night and day temperatures plays a major role in the incidence of the disease. High humidity and a thin layer of free water are required to support the spread of the disease.
The host reacted to the injury approximately one week later, resulting in visible yellow spots on the surface of the paper. Thereafter, yellow-or-orange splashes are produced in longitudinal lines (usually between veins) parallel to the middle vein of the leaf and thus called disease (schizophrenia), and the grain may also become infected. As the plant grows older, they become black.
Rustler (brown rust) Puccinia triticina
It is dispersed all over the world in wheat cultivation, especially in the humid regions where dewdrops are formed frequently during the blossoms with mild temperature, 18 to 22 °C. Usually, the losses resulting from rust of leaves are light to medium, and when the injury is severe it causes a weakening of the growth of plants and may exceed 30%. The disease causes a decrease in the quantity and quality of the resulting grains, as a result of a lack of syphilis and a contraction of the grain.
The symptoms of rust of leaves appear on the top surface of leaves of wheat. This disease affects only the leaves and does not affect the stem and the ears. The symptoms appear in the form of circular vents and dispersed, which do not coalesce with each other, no matter how close they may be, the powder appearance is a little higher than the surface of the paper, it is orange to brown and leaves traces in the hand when touching it in the form of a light brown powder, similar to iron rust, which is a germ of the fungus. As injury and temperature rise prior to maturity these blisters become black.
Black rust (leg rust) Puccinia graminis
This disease is considered one of the most dangerous echo diseases, spreading in all the wheat-growing regions of the world. The loss of crop produced by this disease is 50% in some years, and it may destroy the whole crop when sensitive varieties are infected and conditions are suitable for it.
Injury is caused by wind-borne microbes when appropriate moisture is present. Symptoms of the disease occur at later stages of plant growth. They are formed by large, rigid sprouts with red structure, which are present on the top of a leaf and a spigot and, more often, on the stem of a stalk. They are sealed with the skin of a plant and soon tear themselves apart, keeping their edges open. Germs are produced in large numbers and tend to be powder-looking and spread easily by air.
In the case of severe injuries, the moths stretch and combine to form centimeters of tape, especially on the leg and sheath the sheet, accompanied by twice the leg of the injury, as they lean towards the ground. At the end of the season, the reddish brown moths become black.
The disease suits the relatively high temperatures of 25 - 35°C with high relative humidity.

Host: After reviewing the three types of rust diseases, would it be better to quickly compare them in terms of importance, symptoms and conditions appropriate to each so that the matter is clear to the listener ?

Presenter: Because of a brief comparison between the three varieties of wheat echo, we find that yellow or striped rust is the most important and dangerous of the other two, as mentioned above, because it affects wheat at an early stage in the plant's life. The infection usually occurs in March, when the appropriate conditions of temperature and humidity are available, as happened during the second half of March this year, when rainfall fell for several consecutive days with relatively low temperatures. Therefore, wheat farmers have to go through an environment that is scrupulously and continuously checking their fields to detect infection early and intervene at the appropriate time.
Illness symptoms conditions
The rust, yellow or rusted, planned in small but orange rounded coats; placed in longitudinal lines on the top surface of the leaves parallel to the middle race; also on the covers of the leaves, and found on the roof and within the temples. Relatively cold weather, temperatures of 10 to 15 m ± 2 m, with a wide difference between night and day temperatures having a major role in the incidence of disease, high humidity, and a light layer of free water on the plant surface being a prerequisite for injury.
Brown rust or rustle of leaves The squirts are radically shaped and are scattered randomly across the leaves It plagues the leaves rather than the legs and the ears. The color of these sprouts is orange-brown and they don't stick together no matter how close they get. Propagates in the humid areas where dewdrops repeatedly form during the flower phase with the availability of temperate heat, between 18 and 22°C.
Black rust
Or the stench of the leg is a reddish brown, brown-brown, and black; on both sides and sheath of the paper, on the market, on the ears of grain, on the roof, on the roof, on the roof, on the clay, on the storms, on the storms, and on the edge of a ruptured and pointed. The disease suits the relatively high temperatures of 25 - 35°C with high relative humidity.

Host: What are the conditions and factors that encourage reverberations and that must be taken into account in order to minimize the risk and damage to wheat rust echoes?

Presenter: For diseases to occur in wheat, there must be a sensitive and susceptible wheat species, with a formidable strain of the pathogen, and there must be appropriate atmospheric conditions of temperature and humidity. Striped rust needs a relatively cold environment, leaves rust needs a mild climate, and black stack needs relatively high temperature. All of these types require high atmospheric humidity (frequent rainfall - Fog - Nada). When these factors, known as the disease triangle, are all present, wheat farmers must be careful and carefully monitor wheat fields so that they can intervene in time in case of infection.
Also one of the wrong agricultural practices that propagates echoes is the increase in plant density in the unit of area and the over-fertilization of azote.

Host: What are the strategies for the management of echoic diseases?

Presenter: Because of the speed with which these diseases produce infectious iodine spores and their long-range airborne spread, as well as their ability to develop new strains of disease, the task of controlling and managing them is very difficult.
In general, the control of rust diseases depends on:
The practice of raising and cultivating resistant varieties, which meet other agricultural requirements and resist other diseases. Attention should be paid to the fact that one resistant species is not grown on large areas because in the event of a break in the resistance quality and injury, the losses would be very large.
Also, early planting can help plants avoid infection, as they are in a stage of maturity before the disease gets serious, thus reducing the effect of the disease on them and on the resulting crop. In addition, early planting reduces the number of pathogen generations during the season.
The gradual exclusion of rust-susceptible varieties of wheat (Cham 8-Cham 10) and their replacement by hard wheat and, where necessary, the cultivation of more tolerant soft varieties of wheat such as Douma 4
From the previous season's fallen grains, which form a green bridge to conserve rust vaccine, and the disposal of wild grasses that can serve as an alternative host to the disease.
Detect the occurrence and spread of rust in all wheat-growing areas to monitor the occurrence of the initial sites (March) and take appropriate measures to combat them early.
Cultivation of limited areas of rust-sensitive varieties in the main wheat-growing areas in order to predict rust.
There is a mistaken belief among wheat farmers in Syria that increasing the quantity of seeds will lead to an increase in crop yields. Although experience has shown that the optimum wheat seed rate is 180- 200 kg/ha, wheat farms still use an average of 250-300 kg/ha, which contributes to increasing plant density coupled with high atmospheric humidity and a higher prevalence of diseases. Also, nitrous fertilization and irrigation must not be exaggerated as this encourages vegetable growth and tissues become more and more susceptible to infection.
The practice and recommended use of safe pesticides, such as the effective pesticide Amstar Extera 280 in the control of rust diseases, to control the disease as it arises and before it becomes more severe and epidemic.

Host: What other important diseases afflict wheat in Syria?

Presenter: A second important group of fungal diseases affecting wheat is coal:
Celletia caries: One of the most common carbonaceous diseases in the world: pathogen spores are located on the surface of grains or lie in the soil. When conditions of heat and humidity become available, spores are produced and wheat initiatives are infected before they appear on the soil surface. Mushrooms grow inside the plant tissues.
The infected plants appear relatively scattered in the field. The most important symptom of the injury was the appearance of infected, immature ears in dark green. The affected grain was unwashed and its crores were spaced. The cardboard cardboard cardboard cardboard cardboard cardboard cardboard was puffy, brown and shorter than healthy grains, and when crushed, it produced a black fungus called the mushroom spores, which smelled like puffy fish as a result of the presence of trimethylamine.
Loose Charcoal Tribe:

Mushroom spores are propagated by the air from infected grain, infecting other grain spores at the time of blossoming, and infecting grain embryos at the time of formation. Grains look healthy in the harvest. The next season, when they are grown, they show the symptoms of infection. The infected grain occurs several days before healthy grain. The grains are turned into black bog blocks covered with a thin membrane that is torn by air and spread by spores.
To prevent this disease you must:
The management of retroviral diseases is done through several points:
· cultivation of resistant varieties
· The use of sound seed and fungal disinfectant laboratories
· Appropriate agricultural cycle

Host: If we move to talk about the insect pests that infect wheat, what are the most important of these pests?

Presenter: The Soneh bug is considered one of the most dangerous wheat insects because of the economic damage it causes annually. The insect is prevalent in most provinces that grow wheat, especially Aleppo, Idlib, and Hasakah. The insect feeds on most parts of the plant, including leaves, stalks, and grain. Piercing portions of its mouth are embedded in plant tissues and absorbed. The damage to the grain ranges from complete damage if the grain is infected in the milky phase, to mild atrophy if it is injured in the later stage of maturity. A black dot on the grain surrounded by dark halo is evidence of the insect's infection. The result of the pill injury is low yields, reduced plant capacity and resulting quality of bread.

Host: What is the integrated control program for the Sonnet insect control?

Presenter: The integrated control program for the Sonnet insect contains several points:
- Early cultivation of wheat and early cultivation of varieties in maturity and harvest.
- The collection of adult sonar insects scattered from places of environment and insects migrating to the fields before they begin laying eggs.
- Installation of study machines on wheat harvesting and reduction of harvest height to kill insects on wheat plants during harvest.
- The preservation of intrusions intruding on the eggs of the Soneh insect and on the whole insect, by securing food and shelter for them through the planting of flowering forest trees around wheat fields, the introduction of flowering medicinal plants into the agricultural cycle, and the rationalization of the use of chemical pesticides in order to protect these intrusions
- The use of pathogenic breakfast cereal preparations for insects, especially the species Beauveria bassiana, in the autumn under the trees and plants under which the yeast insects have been planted.
- When the insect density in wheat fields reaches the economic threshold of 3 insects per square meter for mothers coming out of the environment. and 8 insects per square meter for mermaids and whole insects from the new generation. Chemical spraying can be performed using low-impact insecticides on biological enemies, and only partial spraying of the affected field limbs can be performed to maintain biological enemies.

Potato crop

Host: What are the most important insect pests affecting the potato crop in Syria?

Presenter: There are many insect pests that infect the potato crop in Syria and are considered to have a major economic impact because they affect plant growth and consequently the quantity and quality of the crop.
In fact, one of the most important lesions of potatoes is a group of absorbing piercing insects, such as aphids, white flies, and sediment. These insects are fed by the absorption of plant tissue causing direct damage and indirect damage as a result of the transmission of several dangerous viral diseases to the potato crop.
They occur for long periods of the year. They infect hundreds of plant species and reproduce at high velocity in a short time in the summer. In adult Females, after a few days, the mermaid develops and begins to reproduce.
The symptoms of this group of insects appear in the form of the wrinkling of small potato leaves, the deformation of modern patterns, the warping and yellowing of large leaves, with white patches that become dark later in the case of the white fly, and silver spots formed on the bottom surface of the leaves as a result of the cells emptying their content when the insect is infected. The excess juice of aphids and white flies is graduated in the form of a honey colloquium on the leaves of the plant, and is grown on the spray fungi, causing photosynthesis, respiration and transpiration. When the injury increases, the plants become stunted, the leaves become dried and die. The plants may die before they reach maturity, resulting in a large movement of the crop in quantity and quality. An indirect damage to this group of insects is the transmission of many dangerous viral pathogens to the potato crop, which lead to qualitative and quantitative decrease in the crop, such as the Potato Wrap virus and the Potato Wai virus, where they are transmitted by the insects of the manna, especially from the Green Penguin. Also, the virus of tracked tomatoes wilt (TWV), which affects the potato, is transmitted by the insect of sediment.

Host: What is the way to combat these pests?

Presenter: Potato farmers often have difficulty controlling these pests and can quickly become an epidemic eliminating the crop when conditions are right. Therefore, we must follow integrated programs using all known methods of fighting. Using a single control method such as relying only on chemical control may not be feasible at all. On the contrary, it may make matters worse and pest resistance against pesticides.
The integrated pest management program includes several steps, including:

- Agricultural practices:
    - the planting of disease-free potato seeds from a reliable source and the disposal of infected plants to prevent the spread of viruses even with large numbers of vector insects.
    - Weeds which may serve as substitute families for these insects and are preferably sprayed with pesticides before they are mechanically removed to prevent insects from moving to potato plants. Ozone-fertilizing and irrigation balance.

    - The abandonment of potatoes intended for the production of seeds away from the families of these insects such as almond trees and abandoned vegetable farms.
- The second point in the integrated control program that should be focused on is the use of color and pheromone fisheries, the manna insects and white flies attract to the yellow color while the bug of the sediment is attracted to the blue color. The use of slime traps is an effective way to monitor the occurrence and spread of the infection in potato fields.

Chemical control is used as a last resort when necessary and is used in criteria to reduce its harmful effects such as the procedure for spraying when the pest reaches the economic threshold using specialized pesticides and within recommended concentrations, taking into account the period of safety for the pesticide before harvesting the crop. Spray is done with a well-known and specialized machine pesticide such as Spinetoram, Flonicamid, Dimethoate Abampectin, with the surface of the leaves covered by the spray solution.

Host: What are the most important diseases affecting the potato crop in Syria?

Presenter: It can be said that viral diseases are the most prominent problem facing the production of potatoes in the world today. They are the main reason for the deterioration in the production specifications of potatoes from one year to another, because these diseases are transmitted through tubers used as seeds, in addition to their rapid spread in the fields during the vegetable growth of plants by tankers.
Most viruses cause symptoms called mosaic or mosaic and show symptoms as high as paper deformities and stunting when combined infections occur with more than one virus, which in turn dramatically affects the amount of production. In general, the symptoms and underproduction are related to the cultivated species, the virus strain and environmental conditions.
The main viruses circulating in Syria that are affecting the potato crop are the potato Y virus, the potato X virus, and the potato wrap virus. The severity of these diseases comes from the fact that they do not present outward signs of tuberculosis (TB). Tuberculosis (TB) may appear to be externally sound, but in fact they are carriers of these viruses, and the infection can only be detected through laboratory tests such as the Alisa test.
These viruses are transmitted from season to season by infected tubers and, within the same season, by infected plants, which are hotbeds for these viruses, to healthy plants by insects, nematodes and fungi. The aforementioned absorbent pests are among the most common vectors of potato viruses.

Host: What is the best way to combat viral potato disease?

Presenter: resistance to viral potato disease: Most potato viruses are resisted in three main ways:

- Cultivation of resistant varieties.
- Cultivation of certified and reliable seed.
- Application of certain agricultural practices.

Viral potato diseases are resisted in developed countries by official institutions that produce virus-free clean seeds for resistant potato varieties. In developing countries, including Syria,

however, the production of certified potato seed is still very limited, and in these countries, farmers often obtain potato seed from their former crop or through informal trade involving low-quality agricultural materials.
The application of certain agricultural practices helps significantly to resist viral diseases and limit their spread in potato fields. The most important of these practices are:

1. Cultivation of potatoes in isolated areas and away from crops that serve as alternative families to potato viruses.
2. Manipulation of the history of agriculture to avoid the peak of insecticide vector activity, such as early farming to avoid late viral infection.
3. The periodic and repeated purification of potato fields early in plant life and the removal and disposal of plants displaying infection symptoms.
4. Herbal control that may contain potato viruses.
5. Timely harvesting and destruction of vegetable collections and early crop eradication.
6. Insect control by using pesticides when needed to reduce damage and prevent the spread of viral diseases.

Host: What is tablet disease? Why is this important for potato crops?

Presenter: Potatoes are the cause of many fungal and bacterial diseases both in the field and in the storeroom. The infection often occurs in the field and develops in the storeroom, causing significant economic losses. When the infected tubers are grown, the diseases are transmitted to the second season.
Some of the most important are delayed onset diseases, caused by Phytophthora infections, and Tinaria solani's premature page. Peptic diseases are among the most serious of the diseases affecting potatoes and are the main determinant of potato production in most countries of the world. You need rainy conditions, high humidity, and mild to cold heat. Infected tuberculosis (TB) and residues from the former crop are the main sources of infection for which the fungus lives from season to season. Other infected Pandanes are another source of infection when they grow potatoes next to them (Adolf et al.). 2020).
The symptoms of the backlog in the potato vegetation begin with the appearance of water spaces on the tops and edges of the leaves. At low temperature and high humidity, it turns black brown with a yellow halo around it. At the progression of the injury, a gray dormouse emerges on the bottom surface of the leaves against the affected areas; bacterial mushroom carriers emerge from the holes in the leaves. The stalks of the leaves can become infected, the stalk of the plants, and eventually the whole throne dies.
The premature blast often affects the lower leaves of the plant first and then extends upward. The leaves show small, circular or oval patches of dark brown and leather with circular rings, and the host tissues that surround these patches are pale yellow, as the injury progresses. These patches stretch and coalesce, resulting in the dehydration and death of potato leaves.
Tubers that are not covered are infected when washed germs fall with dew drops, rain water, or during irrigation and become covered with deep patches. Tissues that are under the injury zone are rotting, in poor storage conditions, and when high humidity, the disease develops and causes full rotting. It is recommended to cover exposed tubers so that they are not susceptible to infection. Tuberculosis infection can also occur during crop removal when tubers touch the germ-contaminated seedlar, especially if the tubers are wet or injured so it is advisable to harvest the vegetable crop before taking off.

Integrated control of early and late blast disease on potatoes:
Patients with early and late ultraviolences are similar to the nature of the initial infestation through the initial vaccine, and thus the spread of the disease rapidly increases as a result of reproduction, germ diffusion, and frequent secondary infections during the same season. This helps the disease develop into an epidemic. Therefore, the integrated control program for both the late and early period of the potato crop is carried out in a variety of ways:
Agricultural practices:
The cultivation of resistant and early-matured varieties ⟩ prevent the disease from becoming epidemic.
Growing a sound seed, removing infected plants from the field continuously, burning them and disposing of residues from the former crop to reduce the source of the initial vaccine for the disease.
Following an agricultural cycle without any other pathogen families, paying attention to agricultural processes such as plowing the soil well before planting, and not intensifying cultivation so as not to increase the moisture among the plants.
Not cultivating in fields adjacent to infected tomatoes or potatoes and pursuing an insect resistance program so as not to cause wounds that facilitate the entry of the pathogen.
It is advisable to leave tubers in the soil for a period of not less than two weeks after the crop has matured until the tuber's crust has matured properly and the incidence of injuries during harvest is lessened. This also helps to dry the plant throne and the death of the nurse and reduces the rate of transmission of tuberculosis.
Tubers should not be left in high humidity conditions after harvest and not put into piles so that the infection does not pass from infected tubers to healthy ones and that pre-storage dehydration treatment is performed.

biological control: This is done through the use of several species to curb the spread of the disease, such as the use of fungi Trichoderma viride, Pennellum viviasum, and bacteria of the races Bacillus, Pseudomonas.
chemical control: The application of a chemical control program, when necessary, using a preventive insecticide before the injury occurs to prevent the infection, based on forecasting programs that depend on the monitoring of environmental conditions and the source of the initial vaccine for the disease. A therapeutic spraying procedure in the event of the infection using systemic insecticides. Among the most important pesticides used are Action Pro (Cymoxanil+ Famoxadone), Redomel (Mancozeb+ Metalaxyl), Mancozeb.
Through this detailed explanation of the integrated control programs, we would like to convey a message with the aim of changing some of the misconceptions and agricultural practices in the use of pesticides and moving towards organic agriculture to reduce the impact of pesticides on the environment and public health.

Host: To be a successful potato farmer what are the important actions and things to watch out for?

Presenter: To be a successful potato farmer, we must focus on three main points:
1- Seed potatoes, or socalled seeds, and its purity and purity from diseases and the source of this seed.
2- Agricultural practices must be carried out in a timely and correct manner.

3- The location and location of potato cultivation, the choice of location of cultivation and the fact that it is within an agricultural cycle are also important, especially if agriculture is for seed.

Host: Why is the system of seeds production an important step for the success of potato cultivation and the reduction of the spread of diseases?

Presenter: High-quality potato seed is one of the most important ingredients of high productivity in all potato production systems in the world and is the most important step and pillar in the success of potato cultivation. The low productivity of potato crop in developing countries is largely due to the poor quality of seed used in agriculture. The development of the potato seeds production sector is therefore of great interest to Governments, researchers, development agencies and civil society organizations. To understand the importance of seed clearly and accurately, let us urgently review the world's potato seeds production systems.
Globally, potato seeds production systems are often divided into formal and informal systems.
Formal seeds production systems provide high-quality agricultural materials, in a timely and affordable manner, to all who need them. It also reduces the risk of disease spread and outbreaks by keeping them under control through repeated tests for infection. On the contrary, informal vaccine production systems can be very effective in spreading pathogens because of the lack of good quality control and disease-free coverage.
In high-yield potato-producing developed countries, such as the United States and Europe, formal systems for producing high-quality potato seeds and certification prevail. In these systems, potato varieties are kept as small plants for breeding in the way tissues are grown. These primary plants, often called parent plants, are tested for all serious pathogens, including major potato viruses and common bacterial and fungal pathogens.
On the contrary, in developing countries, efforts to implement formal production systems have largely been unsuccessful, and certified seeds are often unavailable or costly. Instead, farmers in these countries receive 95% of the potatoes from the informal system, either from the previous year's harvest or from friends, neighbors, relatives or local markets, in which case seeds are often of poor quality because they are produced in high-risk conditions with little or no control to test their quality and as a result the potato crop yields are low.