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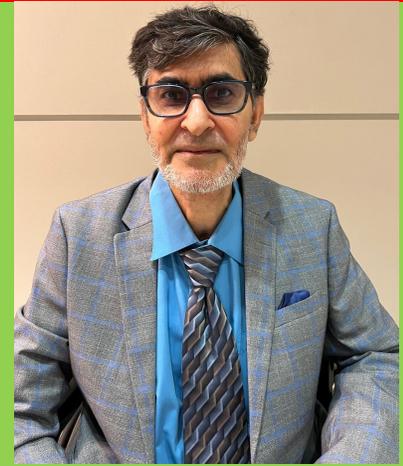


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Message: from the President of BioNatural Healing College (BNHC)

Greetings!



I am thrilled to express my heartfelt gratitude to the Almighty God for granting me the privilege to introduce the BioNatural Healing College (BNHC) E-Magazine May 2024 edition to our esteemed readers. Additionally, I extend my thanks to each one of you, especially our cherished readers, for your invaluable feedback and unwavering support. It's important to emphasize that the content within this magazine is intended solely for educational purposes, the author's perspectives are independent of any affiliation with BNHC.

We have high hopes that this BNHC E-Magazine will prove to be a valuable resource, made possible by the diligent contributions of esteemed researchers and colleagues from across the globe. With gratitude, I wish you all the best in health and a life filled with prosperity.

Warmest regards,

Dr. Nadir Sidiqi, Ph.D.



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BioNatural Healing College Stands on Seven Core Pillar Foundations as follows:

1. All living organisms are made from the water this beautiful connection, connects us to praise the Creator of Creation for the provision of feeding, fueling, and healing to humanity.
2. No harm to public health and environmental health (Biodiversity) including pollinators, surface water, groundwater, soil, and air.
3. A series of complex chains involved with food production from the field to the mouth of the human body desperately needs scientific research to maximize healthy nutritionally food production and end malnutrition and food insecurity.
4. Harmful pests such as insects, and pathogens causing to human and plant health and loss of economic problems. BioNatural chemicals from plants, microorganisms, and ocean-living organisms exist and need further research to discover along with safety to utilize for the health improvement of humans as well as BioNatural Pest Management (insects, fungi, bacteria, various, nematodes, weeds, rodents, etc.).
5. Listen, love, appreciate, and respect with deep conscience and subconscious the connection between the genes of your body and beautifully ecologically in sense of feeling, feeding, fueling, and healing.
6. The brilliant human mind can irrigate with balance drinking clean water as a whole-body system to detoxify the toxicant from their body systems as well as to detoxify the soil, water, and environment from harmful chemicals, particularly pesticides through collaboration, and dedication from the individual, family, community, and scientific community locally and globally.
7. BioNatural Healing College provides a high-quality science base foundation through online education to fit and accommodate the needs of each prospective student for the sustainability and prosperity of his or her own, family, community, and humanity.

Why Plant Diseases Are Important to Human

By Fatemeh Khodadadi¹, Mehdi Kamali¹

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University of California, Riverside

On behalf of BioNatural Healing College (BNHC), it is with great pleasure that we extend a warm welcome to Dr. Fatemeh Khodadadi and Dr. Mehdi Kamali. We deeply appreciate their valuable contributions and the dedicated academic support they bring to BNHC. Both esteemed colleagues, Dr. Khodadadi and Dr. Kamali, are currently engaged in teaching and research at the University of California Riverside Department of Microbiology and Plant Biology.

We extend our best wishes to them for continued success and prosperity in their endeavors. We are honored to have them as part of the BNHC community, and we look forward to their continued contributions and collaboration.

Introduction: The difference between plant diseases and human diseases are thoughtful and insightful phenomenon because plants are voiceless to speak about their disease, while humans can state their health problems to the physician. Plant diseases are any conditions that interfere with a plant's normal functions. They can be caused by a variety of factors, including living organisms such as fungi, bacteria, viruses, nematodes, and parasitic plants are called biotic (living) factors. These organisms are called pathogens and can infect plants and damage their tissues. Plant diseases can also be caused by nonliving factors such as extreme temperature, nutrient deficiencies, water stress, air pollution, and herbicide toxicity (a degree of damage to an organism). These factors can weaken plants and make them more susceptible to infection by pathogens. Plant diseases can cause a variety of symptoms, including wilting, leaf spots, blights, rots, cankers, and stunting. BioNatural Healing College

Plant diseases can have a devastating impact on agriculture, causing billions of dollars in losses each year. They can also reduce the quality and quantity of food that is available for human consumption¹.

The study of plant diseases is called plant pathology. Plant pathologists work to develop methods to diagnose and control plant diseases, such as using resistant plant varieties, applying fungicides, bactericides, or other pesticides, and improving cultural practices, such as crop rotation and sanitation. By controlling plant diseases, we can help to ensure a healthy and abundant food supply. Overall, plant diseases are a significant threat to human health and well-being. By understanding and addressing these diseases, we can work towards a more secure and sustainable food system. Plant diseases may seem like an agricultural concern, but their reach extends far beyond farms, impacting human health and well-being in several profound vital issues. Additionally, plant disease development requires three factors for disease such as the presence of 1. an aggressive pathogen, 2. a susceptible host (plants), and 3. a favorable environment, once these three factors come together with the time factor the plant disease will develop. Understanding the interactions among these factors helps plant pathologists predict, manage, and control plant diseases effectively. Here's a closer look at this complex relationship between plant diseases and human health:

1. Reduce food availability: Plant diseases can devastate crops, leading to food shortages and price hikes. This can cause hunger and malnutrition, especially in developing countries where people rely heavily on staple crops like rice, wheat, and corn.

Plant diseases significantly reduce food availability on a global scale, impacting both the quantity and quality of our food supply. They achieve these detrimental effects by directly attacking plants, weakening them, and hindering their ability to produce fruits, vegetables, and grains. Studies estimate losses due to plant diseases can range from 20% to 40% of global food production. This translates to a substantial decrease in the total amount of food available for consumption. Even if a diseased plant survives, the quality of its produce might be compromised. Diseases can cause blemishes, wilting, and rotting, making the food unappealing or even unsafe to eat. This reduces the amount of usable food harvested and contributes to food waste. When diseases significantly reduce crop yields, the scarcity of food drives up prices. This can disproportionately impact low-income populations who struggle to afford essential food items. Plant diseases don't just affect crops in the field. Pathogens can also infect and spoil food during storage and transportation, especially in areas with poor infrastructure and handling practices. This further diminishes the amount of food reaching consumers².

2. Reduced Food Quality: Plant diseases wreak havoc on food quality in several ways, impacting everything from appearance to safety. Here's a breakdown of how they achieve this: Disease-causing organisms directly attack plant tissues, causing blemishes, wilting, and rotting. This makes the produce visually unappealing and potentially unsafe for consumption. For instance, fungal infections can cause scabs and discolorations on fruits and vegetables. Bacterial diseases can lead to mushy textures and foul odors. Diseases can interfere with a plant's ability to absorb nutrients and photosynthesize. This can lead to fruits and vegetables with lower levels of vitamins, minerals, and antioxidants. While still technically edible, the nutritional value of the food is diminished. Besides, certain plant diseases, particularly those caused by fungi, can produce mycotoxins – harmful toxins that accumulate in the plant tissues. These toxins can pose serious health risks if consumed, even at low levels, and cause serious health problems.

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Diseased plants are often weaker and more susceptible to secondary infections from other pathogens like storage rot fungi. This accelerates spoilage and reduces the shelf life of produce³.



Fig 1: Apple scabs (Pathogen: *Venturia inaequalis*)

Typical “scabby” lesions are diagnostic symptoms of advanced apple scab on fruit. Source: APS

3. Economic Impact: Plant diseases can cause significant economic losses for farmers, impacting their livelihoods and potentially disrupting the food supply chain. Plant diseases deliver a significant blow to the global economy, impacting various sectors and causing billions of dollars in losses each year. Plant diseases directly reduce the amount of crops harvested. Estimates suggest that pathogens are responsible for losses ranging from 20% to 40% of global food production³. This translates to a substantial decrease in the total output from farms, impacting income for farmers and leading to potential food shortages. Even if a plant survives a disease, the quality of its produce might be compromised, making it unsuitable for sale or fetching a lower price.

This reduces the overall value of agricultural output. Farmers often resort to applying fungicides, bactericides, and other pesticides to control and prevent plant diseases. These chemicals can be expensive, adding significantly to production costs. Implementing strategies for disease detection, monitoring, and prevention requires additional labor and resources, further increasing costs for farmers. Plant diseases make trade disruptions: To prevent the spread of plant diseases, countries often impose strict quarantine restrictions on agricultural imports. This can disrupt international trade flows and lead to economic losses for both exporting and importing nations. The threat of disease outbreaks can create uncertainty in the agricultural market, leading to price fluctuations and impacting investor confidence. Diseased produce is more susceptible to spoilage during storage and transportation. This leads to food waste and financial losses throughout the supply chain. Diseased fruits and vegetables might not be suitable for processing into various food products, leading to further economic losses for food manufacturers⁴. The following examples illustrate the specific economic impacts of certain plant diseases on human societies.

The Irish Potato Famine (1845-1852): The Irish Potato Famine, also known as the Great Hunger or the Famine of 1845-1852, was a devastating period of starvation and disease that struck Ireland in the mid-19th century. It remains one of the worst humanitarian catastrophes in European history. Here's a breakdown of the key aspects: A fungal disease called late blight (*Phytophthora infestans*) attacked potato crops across Ireland. This disease caused the potato tubers (the underground starchy part that people eat) to rot, leading to widespread crop failure. Potatoes were the main source of food for most Irish people at the time. The crop failures resulted in widespread hunger and malnutrition.

Estimates suggest millions died from starvation or related diseases like typhus. Many people were forced to leave Ireland to escape the famine, with millions emigrating to North America, Australia, and other countries. The Famine caused immense social and political unrest in Ireland. There was resentment towards the British government, which some felt did not do enough to help the starving population. The Famine significantly reduced Ireland's population, which has never fully recovered. The Famine continues to shape Irish national identity and its relationship with Britain⁵.

Coffee Rust: Coffee rust, caused by the fungus *Hemileia vastatrix*, is a devastating disease that wreaks havoc on coffee plantations worldwide. While it doesn't directly harm humans, its impact on coffee production has significant consequences for people, particularly coffee farmers and consumers. Coffee rust can reduce crop yields by 30% to 50%, significantly impacting the income of coffee farmers. This can lead to poverty, hardship, and even displacement for those who rely heavily on coffee cultivation for their livelihood. Widespread outbreaks can disrupt the global coffee supply chain, leading to price fluctuations and potential shortages. This can affect roasters, distributors, and ultimately, coffee consumers. When coffee crops fail due to rust, farmers may be forced to abandon their land or find alternative work, disrupting traditional ways of life and potentially leading to social unrest. Job losses in the coffee industry due to rust outbreaks can push people to migrate to urban areas in search of work, putting a strain on resources and infrastructure. As farmers abandon unproductive coffee land, they may resort to clearing forests for new agricultural purposes, contributing to deforestation and environmental degradation. Research into developing coffee varieties resistant to rust offers hope for the future of coffee production. Besides, implementing sustainable farming practices that promote healthy soil and plant diversity can help reduce the risk and impact of coffee rust. Overall, coffee rust is a complex issue with far-reaching consequences for people around the world. By supporting research, promoting sustainable practices, and fostering fair trade initiatives,

we can help ensure a more secure and sustainable future for coffee and the communities that depend on it⁶. **Ergotism:** Ergotism is a serious illness caused by ingesting rye or other grains contaminated with ergot alkaloids, toxic compounds produced by a fungus called *Claviceps purpurea*. While not a direct threat in the modern world, ergotism has a chilling history, causing widespread illness, hallucinations, and even death for centuries. Let's delve into the impact of ergotism on human health: Ergotism can manifest in two primary forms, depending on the specific alkaloids involved: Convulsive Ergotism: This form is characterized by Painful muscle spasms and seizures; Severe burning sensations in the extremities (hands and feet); gangrene, which can lead to amputation in severe cases and mental confusion, anxiety, and even psychosis. Gangrenous Ergotism: This form affects the circulatory system, causing numbness, coldness, discoloration of the limbs, gangrene, and tissue death, often leading to amputations and less frequent neurological symptoms compared to convulsive ergotism. Ergotism plagued Europe throughout the Middle Ages and early modern period, with outbreaks often linked to harsh winters followed by cool, wet springs, conditions ideal for ergot fungus growth. Ergotism outbreaks could devastate entire communities, with people experiencing excruciating symptoms and succumbing to the disease. The bizarre symptoms, including hallucinations and convulsions, were often attributed to witchcraft or demonic possession, leading to fear and paranoia. Rye was a staple food crop in many European regions, making people more vulnerable to ergot contamination, especially during times of famine. Ergotism is rare today due to stricter quality control measures and the availability of alternative food sources. However, it's still important to be aware of the potential dangers such as contaminated Flour indicating that improper storage of rye flour can create ideal conditions for ergot fungus growth, even in modern times and ergot alkaloids have some legitimate medical uses, but improper use of these medications can lead to ergotism symptoms.

Ergotism serves as a stark reminder of the dangers posed by foodborne illnesses. While its historical impact was devastating, modern practices minimize the risk. However, remaining vigilant about proper storage, grain inspection, and dietary diversity remains crucial for safeguarding human health⁷.



Fig 2: A, The fungus ergot turns wheat heads dark brown or purple. **B.** Wheat head infected with ergot. **B.** Black structures replace healthy seeds⁸

5. Impact on medicine: The impact of plant diseases on medicine is a fascinating, though often indirect, relationship. While plants themselves aren't directly used to treat most diseases, plant diseases can influence medicine in several ways: Plant diseases can devastate populations of medicinal plants, making it harder to access crucial ingredients for traditional and alternative medicines. For instance, a fungal disease called "ash dieback" has threatened the European ash tree (*Fraxinus excelsior*), a source of compounds used to treat fever and inflammation⁹. Plant diseases can also reduce the availability of research materials. For instance, many plants serve as a vital source of natural products for drug discovery. Diseases can significantly reduce the availability of these plants, hindering research efforts to develop new medications. Some fungal diseases impacting food crops produce mycotoxins, harmful toxins that can accumulate in the plants. These toxins can pose health risks if ingested and might even contribute to antibiotic resistance in some cases.

Studying how plants fight off diseases can provide valuable insights for human medicine. Researchers can learn from the BioNatural defense mechanisms plants have evolved to combat pathogens, potentially leading to new strategies for developing drugs or treatments. Certain plant diseases can mimic aspects of human diseases, making them valuable tools for research. Scientists can use these plant disease models to study disease processes, test potential drugs, and develop new diagnostic tools. It's important to note that the impact of plant diseases on medicine is complex and often indirect. While plant diseases can pose challenges, they also offer opportunities for scientific discovery and innovation in the field of medicine. Plant diseases are a complex issue with far-reaching consequences for human health. By investing in research to develop control and prevention methods, we can safeguard our food supply, ensure its quality, and potentially unlock new avenues for medical advancements. This holistic approach to plant health is crucial for building a more secure and sustainable future. For efficient plant disease control, Integrated Pest Management is highly recommended. Integrated Pest Management (IPM) constitutes a data-driven, ecologically sensitive paradigm for pest population suppression. IPM programs leverage current and comprehensive knowledge regarding pest life history and environmental interactions. This knowledge base, in conjunction with a diverse array of available control methods, facilitates the implementation of interventions that suppress pest populations below the economic injury level (EIL) in a cost-effective manner. Furthermore, IPM prioritizes the minimization of potential hazards to human health, property, and the broader ecological balance.

Conclusion: Absolutely! The interconnectedness between plant health, human health, and environmental sustainability is paramount. Plant pathologists and other researchers' colleagues play a crucial role in understanding and addressing the complex relationships between plants, pathogens, and human well-being. Utilizing an approach like Integrated Pest Management (IPM) not only helps to protect plants from diseases but also contributes to sustainable food production, minimizes risks to public health, and reduces the environmental impact of fungicides (pesticides). By prioritizing the development and implementation of such BioNatural methods, we hope this holistic work leads us toward maximizing food production while minimizing harm to ecosystems and human health, benefiting communities both locally and globally.

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Mission: BioNatural Healing College is a non-profit public benefit institution that has tax-exempt status under the Internal Revenue Service, Section 501(c)(3) of the United States of America. Our goal is to offer a high-quality education a diploma program as well as holistic health and nutrition conferences, seminars, workshop, and continuing education. The focus of these educational programs is to offer healing and holistic nutrition science through online distance learning. These dynamic online education programs will provide diverse adult learners throughout the world the experience of enhancing their quality of life, their health, and their happiness.

Vision: The faculty, staff and management team of BioNatural Healing College are passionately committed to providing the best teaching possible in this field. We seek to encourage, motivate and explain the importance of this field to prospective students so that they may make an informed decision regarding enrollment. We seek an ultimate goal of satisfaction for the student based on responsibility, commitment, respect, awareness and sustainable education for society.

Accreditation and Recognition: BioNatural Healing College is based in California. It is an institution that has the goal to deliver on- demand online distance learning around the globe. This education is of high quality and vocational in nature. BioNatural Healing College is a legal business entity that has been approved to operate by the State of California's Bureau for Private Postsecondary Education that set forth in the educational code. BioNatural Healing College is not accredited by the United States Department of Education. BioNatural Healing College is a member of the American Holistic Health Association (AHHA).

