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Physiological Disorders in Solanaceous Vegetables: Causes and Remedies

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Solanaceous vegetables such as tomato, chilli, capsicum, eggplant, and potato are widely cultivated across the world, but their productivity is often hampered by several physiological disorders. Unlike diseases caused by pathogens, physiological disorders arise from environmental stress, nutrient imbalance, improper cultural practices, and varietal susceptibility. Disorders such as blossom end rot, sunscald, fruit cracking, cat face, greening, little tuber disorder, black heart, and hollow heart cause significant yield loss and reduce market quality. Understanding the causes, symptoms, and effective management strategies for these disorders is essential for improving crop performance. This review highlights the major physiological disorders in solanaceous vegetables along with their causes, preventive measures, and future approaches for achieving sustainable production.

Keywords: Physiological disorders, Solanaceous vegetables, Environmental stress, Nutrient imbalance, Crop quality

Introduction

Solanaceous vegetables—including tomato, chilli, capsicum, and potato—are among the most important vegetable crops grown worldwide. However, these crops frequently suffer from a range of physiological disorders that negatively affect their growth, yield, and market value. Physiological disorders are non-pathogenic in nature and occur due to unfavorable environmental conditions, nutrient imbalances, moisture stress, or genetic and hormonal factors, rather than pathogens such as fungi, bacteria, or viruses. Identifying these disorders early and understanding their underlying causes is essential for farmers, horticulturists, and researchers to design appropriate management practices. Effective diagnosis and prevention help maintain crop quality and ensure profitable production.

Common Physiological Disorders in Solanaceous Vegetables

TOMATO

1. Blossom End Rot (BER)

Cause: Calcium deficiency, often exacerbated by water stress or excessive nitrogen fertilization.

Symptoms: Dark, sunken lesions at the blossom end of the fruit.

Remedies: Maintain consistent soil moisture, ensure adequate calcium levels through balanced fertilization, and avoid excessive nitrogen application.

2. Sunscald

Cause: Direct exposure to intense sunlight, especially in plants with inadequate foliage.

Symptoms: Whitish or yellowish patches on the fruit surface, which can become sunken and develop a papery texture.

Remedies: Provide shade during peak sunlight hours, maintain adequate foliage, and use reflective mulches to reduce direct sun exposure.

3. Fruit Cracking:

Cause: Rapid changes in water availability or temperature fluctuations.

Symptoms: Cracks on the fruit surface, which can be radial or concentric.

Remedies: Maintain consistent soil moisture, avoid overwatering, and ensure balanced fertilization to promote even fruit growth.

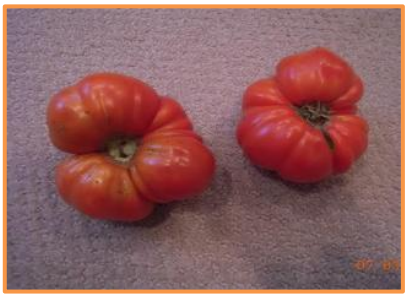
4. Puffiness:

Cause: High temperatures during fruit set or other environmental stressors.

Symptoms: Fruits develop a puffy or hollow appearance.

Remedies: Provide shade during peak heat, maintain optimal growing conditions, and select varieties tolerant to temperature fluctuations.

5. Cat Face



Cause and symptoms: Cat face is a condition involving malformation and scarring of fruits, particularly at blossom ends. Affected fruits are puckered with swollen protuberances and can have cavities extending deep into the flesh.

Remedies: Other than keeping herbicides away from flowers, the only control for cat face is planting less susceptible tomato varieties.

CHILLI & CAPSICUM

Blossom end rot

Symptoms:

Water soaked spots appear on blossom end of the fruits. The spots become light brown, papery and finally lesions dry out

Causes: Heavy application of nitrogenous fertilizer. Heavy irrigation after a dry spell

Remedies: Maintain consistent soil moisture, ensure adequate calcium levels through balanced fertilization, and avoid excessive nitrogen application.

POTATO

1. Greening

Symptoms:

The skin and flesh of tubers or parts of tubers develop a light green to dark green color.

Reason:

Long period exposure to light due to improper healing. Tubers turned green is bitter and become poisonous.

Remedies:

Keep tubers covered with soil before harvest. Store tubers in dark place. Avoid long exposure to Natural or artificial light in Warehouse.

2. Little Tuber Disorder

Cause:

Due to physiological aging of seed tubers, tuber sprout can occur which looks like little tuber. The tuber stored at temperature greater than 68°F and is planted in soil that is less than 50° F. Little tuber disorder can also occur when sprouted seed tubers or pieces are placed in cold storage and then planted. Elevated concentrations of the gases carbon dioxide (CO_2) and ethylene (C_2H_4), a gaseous hormone, may induce little tuber disorder as well as be involved in tuber chaining and heat sprouting.

Control measures:

The key practice is storing seed potatoes at less than 40°F, but above temperatures causing chilling or freezing damage. Avoid long storage of seed tubers. Avoid physiologically aging seed such as rough handling (bruising), poor ventilation or elevated temperatures.

3. Knobs

Symptoms:

Knobs or protuberances called second growth develop on main tuber at points were eyes are located**.**

Reason:

Uneven growing condition and improper irrigation scheduling.

Remedies: Provide fertility and moisture maintain uniform growing condition.

4. Black Heart

Cause and symptoms:

Happens due to lack of oxygen when storing potatoes. Caused by high temperature and too much moisture during storage. The center of the potato turns black, but it doesn't rot. It affects the potato's appearance, which consumers may not like.

Remedies:

Make sure there is good air circulation during storage. Store potatoes in layers, not in big piles or heaps.

5. Hollow Heart

Cause and symptoms:

Caused by very fast growth of potato tubers. Potatoes grow too big and develop empty space inside. A small area in the center dies, causing cracks and hollowness as the potato grows.

Remedies:

Keep soil moisture at the right level (not too dry or wet). Don't use too much fertilizer, especially nitrogen. Choose potato varieties that are less likely to get this problem.

5. Black Spot (Internal browning in potatoes)

Cause and symptoms:

Internal browning of potato tubers, mainly in the vascular tissues. Usually appears within 3 days after mechanical injury. Cause: Related to the presence of phenols and the genetic makeup of the potato variety.

Remedies:

Provide proper storage and good growing conditions to reduce the risk.

6. Freezing Injury in Potatoes

Cause:

Damage to tubers caused by exposure to freezing temperatures. At temperatures of -1.5°C or lower, during or after harvest.

Symptoms:

Discoloration of tissues. Damage to the vascular ring is called ring necrosis. The damage is usually more severe on the proximal end (the part attached to the plant). Effect: Makes the tubers unfit for sale (unmarketable).

Remedies:

Avoid exposing tubers to freezing temperatures during harvest and storage.

Impact of Physiological Disorders on Crop Yield and Quality

Physiological disorders can significantly impact crop yield and quality, leading to reduced productivity and economic losses. Understanding the causes and remedies of these disorders is crucial for developing effective management strategies.

Future Directions

1. Breeding for Resistance: Develop varieties with built-in resistance or tolerance to specific disorders.

2. Precision Agriculture: Implement precision agriculture techniques, such as precision irrigation and fertilization, to optimize crop management.

3. Sustainable Practices: Promote sustainable practices, such as organic farming and integrated pest management, to reduce the environmental impact of crop production.

Conclusion

Physiological disorders in solanaceous vegetables significantly influence crop health, yield, and marketability. Many of these disorders arise from preventable factors such as nutrient imbalance, irregular irrigation, temperature extremes, and improper storage practices. By adopting proper cultural management—such as maintaining consistent moisture levels, balanced nutrition, shade management, suitable storage conditions, and selecting tolerant varieties—farmers can greatly reduce the incidence of these disorders. Future advancements focusing on breeding resistant varieties, using precision agriculture tools, and adopting sustainable farming practices will further help mitigate these challenges. A better understanding of these disorders is essential for improving productivity, reducing economic losses, and ensuring high-quality produce.

References

1. Khan, F. A., Narayan, S., Kumar, S., Bhat, S. A., & Amir, M. (2022). Physiological disorders of vegetables. Advances in Agriculture For Doubling Farmers' Income, 206.
2. Kathayat, K., & Rawat, M. (2019). Physiological disorders in vegetable crops. Advances in Horticultural Crop Management and Value Addition, 307.
3. Salihaj, M., & Salihaj, D. (2022). Identification of physiological diseases of vegetables in the Solanaceae family.