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BIOLOGICAL CHARACTERISTICS OF RASPBERRY (RUBUS IDAEUS L.) AND ITS CULTIVATION TECHNOLOGY

Xakimova Muxlisaxon To'xtasin qizi
Intern at the Department of "Fruit and Vegetable Growing and Viticulture," Andijan Institute of Agriculture and Agrotechnologies, Andijan Region, Uzbekistan
Email: muhlisaolimova2108@gmail.com
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Abstract. Raspberry (Rubus idaeus L.) is an economically valuable berry crop distinguished by high nutritional quality, early fruit bearing, and broad adaptability to temperate climates. The present thesis summarizes the main biological characteristics of raspberry and describes the principal elements of modern cultivation technology. Particular attention is paid to root-system development, shoot biology, flowering and fruiting patterns, temperature and moisture requirements, soil conditions, planting systems, irrigation, fertilization, pruning, pest and disease management, and harvesting. Proper matching of cultivar, site, and cultural practices is essential for stable yield, fruit quality, and plantation longevity. The analysis shows that integrated management of soil fertility, moisture, canopy structure, and plant health is the key prerequisite for efficient raspberry production.

Keywords: Rubus idaeus, raspberry, biological characteristics, cultivation technology, pruning, irrigation, fertilization, berry production.

INTRODUCTION

Raspberry (Rubus idaeus L.) belongs to the family Rosaceae and is one of the most important berry crops of the temperate zone. Its fruits are valued for their pleasant taste, aroma, dietary fiber, vitamins, organic acids, minerals, and phenolic compounds. In addition to fresh consumption, raspberries are widely processed into frozen products, juices, jams, purees, and confectionery ingredients. The crop is particularly attractive to growers because well-managed plantations can enter commercial production relatively quickly. However, raspberry productivity is strongly influenced by biological features such as the perennial root system, biennial cane cycle in floricane-fruiting cultivars, sensitivity to soil aeration, and high demand for moisture during flowering and fruit development. Therefore, a scientific understanding of plant biology is directly linked with the successful organization of cultivation technology [1, 2].

MAIN PART

Raspberry is a perennial shrub with a long-lived underground system and above-ground shoots that differ according to cultivar type. In traditional floricane-fruiting raspberries, first-year shoots (primocanes) grow vegetatively, while second-year shoots (floricanes) flower, bear fruit, and then die. In primocane-fruiting cultivars, flowering and fruiting may occur on the upper part of current-season canes, which makes autumn production possible [1, 3]. This growth pattern determines the pruning and training system used in commercial plantations.

The root system is concentrated mainly in the upper soil layers and consists of perennial roots and numerous fine absorbing roots. Because a large proportion of active roots is relatively shallow, raspberry is sensitive to both drought and waterlogging. Deep, fertile, well-drained loam soils with a slightly acidic reaction are generally considered most favorable. Heavy compacted soils may reduce aeration and

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increase the risk of root diseases, while very light soils require careful irrigation and organic matter management [2, 4].

Raspberry growth begins early in spring. Flowering time depends on cultivar and climate. Flowers are usually self-fertile, although pollinating insects, especially bees, improve fruit set and berry uniformity. The fruit is an aggregate of many drupelets attached to a receptacle. In ripe raspberry fruits, the drupelets separate from the receptacle during picking, which is a characteristic feature distinguishing raspberries from blackberries [3].

Temperature is an important ecological factor. Raspberry generally performs best in cool to moderately warm conditions. Winter hardiness varies considerably among cultivars. Extremely low winter temperatures, warm spells followed by frost, and spring frosts can damage canes, buds, and flowers. High summer temperatures combined with water deficit may reduce berry size and quality. For this reason, cultivar selection should correspond to the local climate and growing season [1, 5].

Site preparation begins with weed control, soil testing, drainage assessment, and incorporation of organic matter if necessary. Planting is commonly carried out in rows, with spacing adjusted to cultivar vigor, machinery, and training system. Certified disease-free planting material is preferred because viral, bacterial, and fungal infections can significantly reduce plantation productivity. Support systems with posts and wires help keep canes upright, improve light penetration, facilitate picking, and increase air circulation [2, 5].

Water management is especially important from flowering through fruit enlargement and harvest. Drip irrigation is often preferred because it delivers water directly to the root zone while keeping foliage relatively dry. Excessive irrigation should be avoided because poorly aerated soil favors root rots. Fertilization should be based on soil and leaf analysis. Nitrogen is needed for cane growth, but excessive nitrogen can cause overly vigorous vegetative development and soft fruit. Potassium and phosphorus are also important, while micronutrient needs depend on soil conditions [2, 4].

Pruning differs between floricane- and primocane-fruiting types. In floricane systems, spent fruiting canes are removed after harvest, while healthy primocanes are retained for the next season. Cane density is regulated to prevent shading and competition. In primocane-fruiting systems, all canes may be cut to ground level during dormancy when a single autumn crop is desired. These practices simplify canopy management and can reduce some pest and disease problems [1, 3].

Integrated pest management is recommended in raspberry production. Common problems include aphids, mites, cane borers, gray mold, cane blights, root rots, and virus diseases. Sanitation, resistant or tolerant cultivars, proper spacing, removal of infected canes, weed control, and rational pesticide use form the basis of disease and pest prevention. Harvesting is performed when berries reach full characteristic color, flavor, and easy detachment. Because raspberry fruits are delicate and highly perishable, they should be picked carefully, rapidly cooled, and handled with minimal mechanical pressure [4, 5].

CONCLUSION

Raspberry (Rubus idaeus L.) is a biologically distinctive berry crop whose successful production depends on close coordination between plant biology and cultivation practices. Its perennial root system, cane renewal cycle, sensitivity to moisture conditions, and specific fruiting pattern require careful management. The most important technological measures include proper site and cultivar selection, use of healthy planting material, balanced irrigation and fertilization, suitable training and pruning, and integrated pest and disease management. When these elements are combined, raspberry plantations can provide stable yields, high-quality fruit, and efficient use of agricultural resources.

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Table 1. Main biological requirements and recommended cultivation measures for raspberry

Biological factor	Main characteristic	Recommended cultivation measure
Root system	Mostly shallow, sensitive to water deficit and poor aeration	Use well-drained soil, mulch, and drip irrigation; avoid waterlogging
Cane cycle	Floricanes fruit in the second year; primocane cultivars may fruit in the first year	Apply cultivar-specific pruning and remove spent canes
Light demand	Yield and fruit quality decline under excessive shading	Maintain proper row orientation, spacing, and cane density
Soil requirement	Best growth on fertile, well-drained, slightly acidic soils	Test soil, add organic matter, correct pH where needed
Moisture requirement	High demand during flowering and fruit enlargement	Maintain uniform soil moisture, especially during reproductive stages
Fruit perishability	Soft berries have high respiration and short shelf life	Harvest carefully, cool rapidly, and minimize handling damage

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