THEORETICAL FRAMEWORK FOR ASSESSING THE BIOECOLOGICAL CHARACTERISTICS OF STRAWBERRY VARIETIES UNDER DIFFERENT SOIL AND CLIMATIC CONDITIONS

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The introduction of new strawberry cultivars into agricultural production necessitates not only the evaluation of their agrobiological traits but also a comprehensive theoretical understanding of their adaptive potential within specific soil and climatic contexts. While many introduced varieties have been previously characterized in controlled or regionally distinct environments, their ecological plasticity and stability under heterogeneous environmental conditions remain insufficiently substantiated [4].

From a theoretical standpoint, crop productivity should be regarded as the result of a complex interaction between genotype and environment (G×E interaction). The adaptive capacity of a cultivar reflects its ability to maintain physiological homeostasis and reproductive efficiency under fluctuating abiotic and biotic stressors [2]. In this context, the assessment of bioecological characteristics extends beyond descriptive phenology and yield indicators and encompasses ecological tolerance, resilience to stress, and biotic interaction dynamics.

The growing relevance of urban and peri-urban agriculture introduces an additional dimension to the theoretical framework of varietal adaptation. Urban agroecosystems represent structurally heterogeneous and environmentally modified systems characterized by altered thermal regimes, fragmented landscapes, and diversified cropping patterns. The phenomenon of the urban heat island creates a distinct microclimatic gradient, which may significantly influence plant metabolic processes, phenological development, and reproductive biology.

Temperature, as a fundamental abiotic factor, regulates enzymatic activity, photosynthetic efficiency, respiration intensity, and assimilate partitioning. In strawberry (Fragaria × ananassa Duch.), particularly in day-neutral cultivars, temperature plays a decisive role in floral induction, fruit set, and berry quality formation. Theoretical models suggest that elevated temperature conditions may induce physiological stress, disrupt carbohydrate balance, reduce pollen viability, and alter hormonal regulation, ultimately affecting yield stability [1].

In parallel, biotic components of agroecosystems function within a dynamic trophic network. Phytopathogens, phytophagous arthropods, their natural enemies, and pollinators constitute interconnected ecological modules. Their population dynamics are temperature-dependent and may be indirectly mediated by urban microclimatic modifications. Therefore, varietal performance should be analyzed within a systems-based ecological framework that integrates both abiotic regulation and biotic interactions.

Existing empirical knowledge regarding yield determinants is predominantly derived from large-scale monocultural agrocenoses in rural settings. However, urban agricultural systems are typically characterized by smaller-scale, polycultural production units with higher structural diversity. Such systems may modify interspecific interactions, microclimatic buffering capacity, and resource competition patterns, thereby altering the ecological expression of varietal traits [3].

The theoretical hypothesis underlying this study assumes that varietal differences in thermal sensitivity and ecological plasticity determine differential yield responses under variable soil and climatic conditions. Consequently, the assessment of bioecological characteristics should incorporate integrative indicators reflecting adaptive stability, stress tolerance thresholds, and interaction-mediated productivity.

This conceptual approach enables a more comprehensive understanding of cultivar performance within diversified agroecosystems and provides a scientific basis for optimizing varietal selection in both rural and urban agricultural landscapes.

References

1. Batziakas, K. G., Talavera, M., Swaney-Stueve, M., Rivard, C. L., & Pliakoni, E. D. (2019). Descriptive analysis and consumer acceptability of locally and commercially grown spinach. Journal of Food Science, 84(8), 2261–2268. doi:10.1111/1750- 3841.14710.
2. Masi B., Fiskio J., Shammin M. Urban agriculture in Rust Belt cities //Solutions. – 2014. – T. 5. – №. 1. – C. 44-53.
3. Memon, R. A., Leung, D. Y. C., & Liu, C. H. (2010). Effects of building aspect ratio and wind speed on air temperatures in urban-like street canyons. Building and Environment, 45(1), 176–188. doi:10.1016/j.buildenv.2009.05.015.
4. Mie, A., Andersen, H. R., Gunnarsson, S., Kahl, J., Kesse-Guyot, E., Rembia»kowska, E., et al. (2017). Human health implications of organic food and organic agriculture: A comprehensive review. Environmental Health: A Global Access Science Source, 16(1), 1–22. doi:10.1186/s12940-017-0315-4.