



Development of Adaptive Technologies for Growing Niche Crops in the Conditions of the Southern Steppe of Ukraine under Climate Change

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Abstract: In the context of climate change, the development of adaptive cultivation technologies for niche bioenergy, essential oil, and spice crops has become increasingly relevant. These crops combine the potential of renewable energy with the opportunity to enhance the added value of agricultural products. The aim of the research was to develop adaptive cultivation measures for niche crops under the conditions of the Southern Steppe of Ukraine. To achieve this goal, field and laboratory experiments, phenological observations, and statistical analysis methods were used. Among the bioenergy crops, the most productive under the arid climate conditions of the Southern Steppe of Ukraine were *Sorghum saccharatum* (L.) Moench., *Sorghum bicolor* L., *Helianthus tuberosus* L., *Helianthus tuberosus* × *Helianthus annuus* L., and *Silphium perfoliatum* L. Essential oil crops demonstrated a high adaptive potential. In the third year of vegetation, the yield of plant raw materials was as follows: *Lavandula angustifolia* Mill. – 5.7 t/ha, *Lavandula hybrida* Rev. – 7.9 t/ha, *Hyssopus officinalis* L. – 6.7 t/ha. Saffron (*Crocus sativus* L.) is one of the most expensive spices in the world, which generates considerable interest in its cultivation. We initiated research into the development of saffron cultivation technologies, considering its advantages: high profitability, potential access to international markets, relative unpretentiousness regarding soil conditions, and increasing demand for organic and niche products. The obtained results demonstrate the high adaptive capacity of niche crops and support their recommendation for cultivation in the Southern Steppe of Ukraine.

Keywords: niche crops; variety; adaptation; productivity; climate change; yield