



ENVIRONMENTAL SAFETY AND INNOVATIVE PLUM GROWING TECHNOLOGY

**Pešaković Marijana, Glišić Ivana, Tomić Jelena,
Lukić Milan, Karaklajić Stajić Žaklina**
Fruit Research Institute, Čačak





**Cultivars developed at
the Fruit Research Institute,
Čačak**



Čačanska rana



Čačanski šećer



Čačanska najbolja



Čačanska rodna



Nada



Valjevka



Jelica



Valerija



Čačanska lepotica



Boranka



Timočanka



Pozna plava



Krina



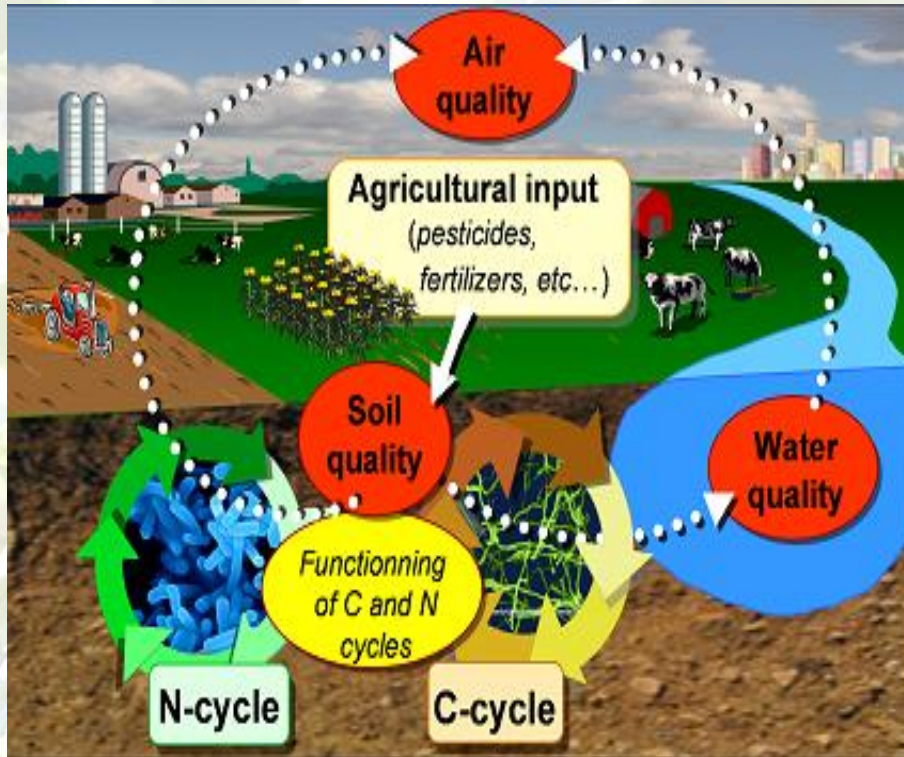
Mildora



Zlatka

Plum - 15 cvs

The use of nitrogenous fertilizers will be increased several times by the year 2050!!!



EUTROPHICATION

the increased presence of easily driven forms of nitrate, which pollutes the surface and underground waters

VIOLATION OF THE OZONE LAYER
excessive nitrate content enhance N₂O emissions into the atmosphere

HUMAN HEALTH PROBLEMS

nitrate accumulation in plants used in human diet above the allowed level

The world population is expected to reach over 10 billion in the year 2050!



application of biological substances or aggregates which contain living cells of different micro-organisms species (microbial inoculants i.e. biofertilizers)



- ✓ **stability of yield and quality**
- ✓ **healthy food**
- ✓ **ecological balance**
- ✓ **economical effect**

AIM

Investigation into the effect of bio- and chemical fertilizer applications on morfometric and chemical properties of 'Čačanska Lepotica' plum cultivar in order to achieve

IMPROVMENT OF PLUM GROWING TECHNOLOGY

MATERIAL AND METHOD

Trial plum orchard



Myrobalan (*Prunus cerasifera* Ehrh.) seedling was used as the rootstock

Planting spacing was 4×2 m (1,250 trees ha⁻¹)

Gornja Gorevnica

(20°57'48" N; 20°19'31" E; 396 m a. s. l.)

The trees were trained to spindle bush system
The planting was established in autumn 2003

Test plant

Čačanska lepotica

(Wangenheims Frühzwetsche × Požegača)



It is a **table** cultivar of mid early ripening time (late July, early August)

Fruit mass is 30–40 g. Skin is deep blue colour with abundant silvery bloom. It turns blue significantly prior to ripening. It has a good shelf-life

Tree is medium vigorous with exceptional crown form

The cultivar is susceptible to fire blight and rust, and the control measures have to be regularly applied

It is **tolerant** to Sharka. It is a self-fertile cultivar bearing crops at all localities

The fruits are suitable for **fresh consumption** and **production of high-quality brandy**



Treatments

CHEMICAL FERTILIZER

water-soluble fertilizer with
microelements
(B, Cu, Fe, Mn, Zn)



CONTROL

non treated trees

BIOFERTILIZER

Azotobacter chroococcum

nitrogen-fixing bacteria Azotobacteria genus synthesizes auxins, cytokinins, and GA-like substances, and these growth materials are the primary substances controlling the enhanced growth.

Bacillus subtilis

gram-positive soil borne
bacterium
produces plant hormones and
solubilizes insoluble phosphates

Bacillus megaterium

gram positive, rod shaped,
endospore forming bacteria
produces organic acids such as
lactic, gluconic, citric, succinic,
propionic and enzymes that help
solubilize the fixed phosphorus into
exchangeable form



- ✓ The fertilizers were applied by foliar spraying from the end of May to mid-August, every 20 days

Parameters monitored

Determination of fruit morphometric traits

Twenty five fruits of plums were sampled at commercial harvest time in the experimental field. Samples were taken from the south-facing side of trees 1–1.5 m above ground, brought to the laboratory. Weight, size and soluble solids content (SS) were measured in representative fruit samples.

Average fruit weight was determined using METLER balance (± 0.01 g accuracy) and data were expressed in g per fruit.

Fruit dimensions (length, breadth) were also determined in the samples by 'Inox' vernier scale (± 0.05 mm accuracy) and data were expressed in mm.

Fruit impact firmness was determined by using a hand-held shore-type Penetrometer and data were expressed in N

Chemical parameters viz. soluble solids (SS) was determined by hand Refractometer and data were expressed in °Brix

Determination of Total Phenolic Content (TPC)

Modified Folin-Ciocalteu colorimetric method

Results were expressed as mg of gallic acid equivalents (GAE) 100 g⁻¹ FW

Determination of the Total Antioxidant Capacity (TAC)

DPPH method

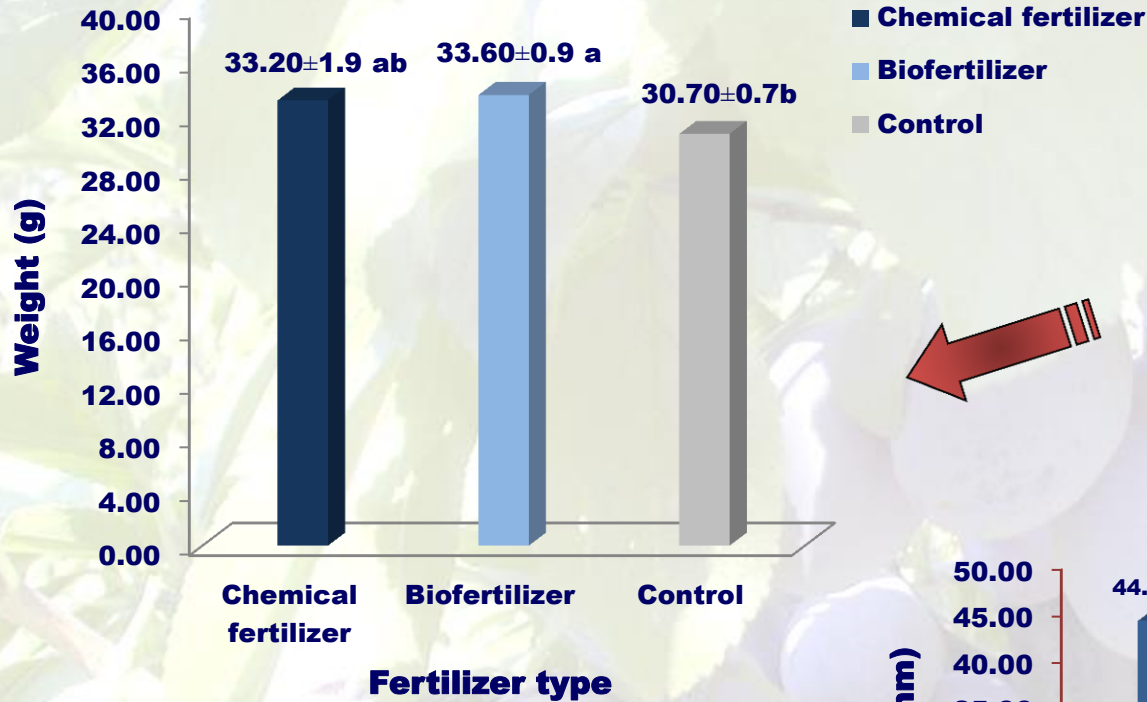
The results were expressed as the Trolox equivalent antioxidant capacity ($\mu\text{mol TE } 100 \text{ g}^{-1} \text{ FW}$).

Statistical analysis

The data were subjected to analysis of variance (ANOVA) using MSTAT-C statistical computer package

The Least Significance Difference (Lsd) was used to compare treatment means and treatments declared different at $p = 0.05$ level of significance

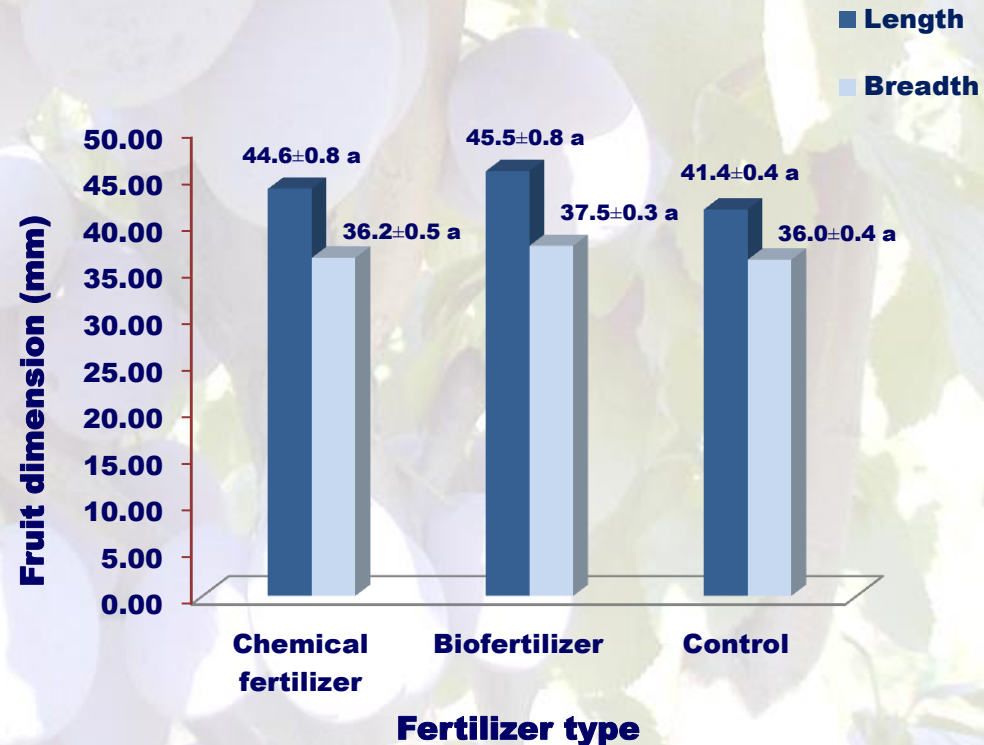
Morfometric fruit traits



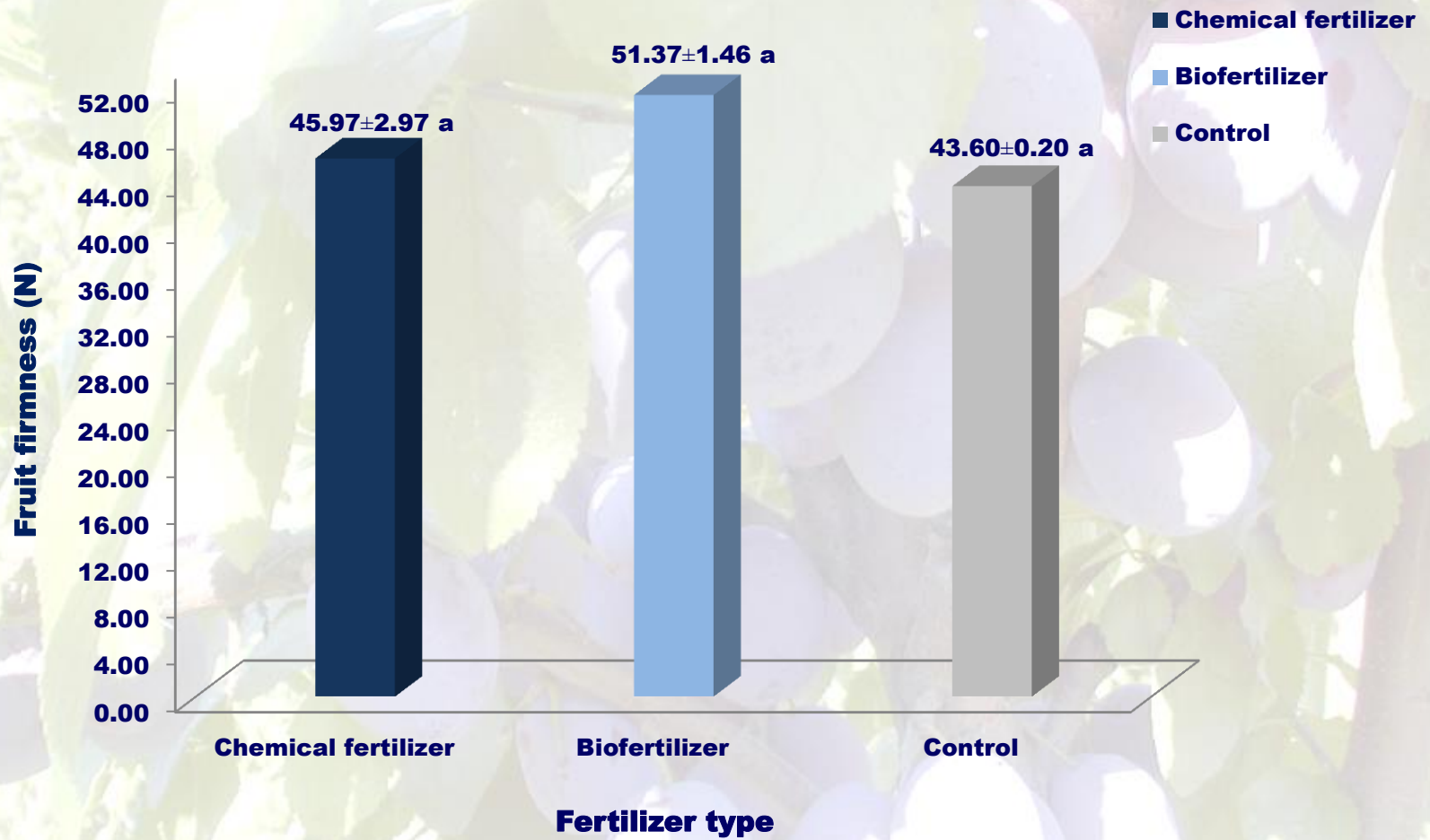
The effect of fertilizer type on fruit weight



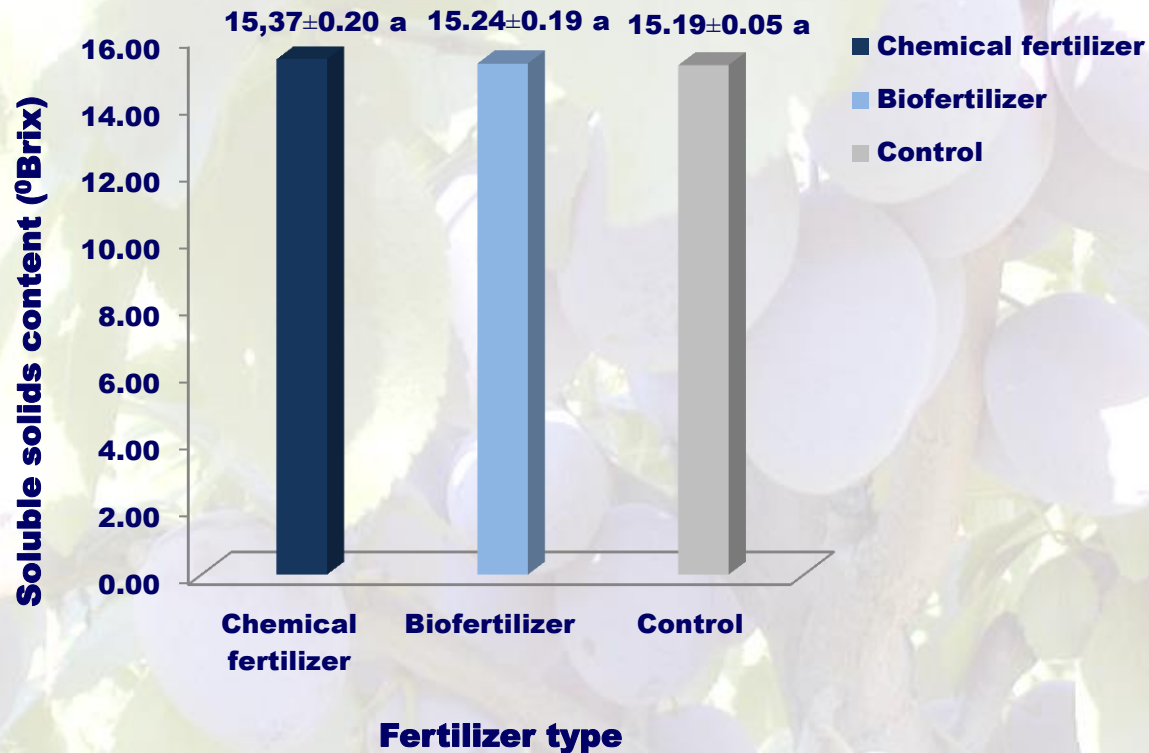
The effect of fertilizer type on fruit dimension



The effect of fertilizer type on fruit firmness

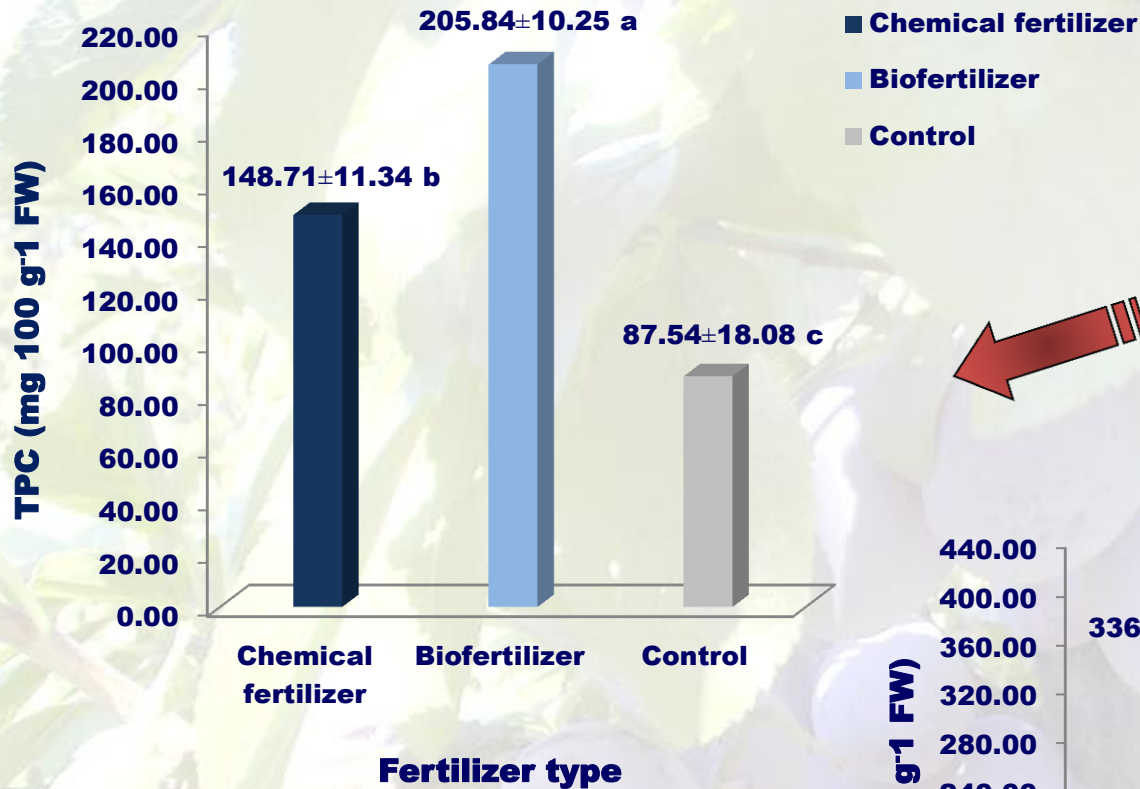


Fruit chemical properties

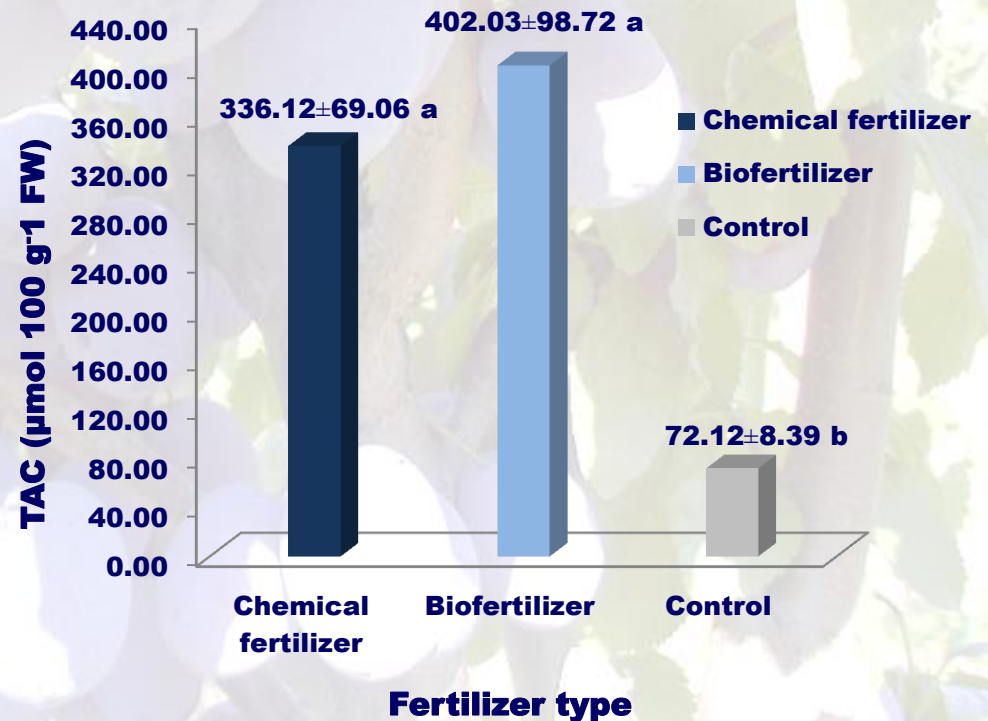


The effect of fertilizer type on Soluble Solids

Fruit chemical properties



The effect of fertilizer type on Total Phenolic Content



The effect of fertilizer type on Total Antioxidant Capacity

Conclusion

Based on the obtained results, cv 'Čačanska lepotica' can be recommended for sustainable plum production, allowing substitution of chemical fertilization by biofertilization

This approach seems to contain a certain potential as an appropriate technique in commercial plum production, which may improve morfometric and chemical properties of plum fruits



Thank you for your attention!