

RESEARCH ARTICLE

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Citrus fruit cultivation in the Republic of Croatia

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Abstract

This paper presents data on citrus fruit cultivation in Croatia and its major production areas, data on plant material production: species, rootstocks and cultivars, plantation area, pests and diseases and on the trade balance of fresh- and dry produce. Regarding the national fruit production area, citrus fruits come sixth with a total of 1,885.60 ha: mandarin 1,816.67 ha, (96.34%), lemon 33.47 ha (1.78%) and orange 33.39 ha (1.77%). According to the plant material production data, the most common rootstock is poncirus (*Poncirus trifoliata* L., Raf.) with a share of 95.43%. The most common mandarin cultivars are 'Kowano Wase', 'Chahara', 'Zorica', 'Owari', 'Okitsu'. Mediterranean fruit fly, grey citrus scale, citrus whitefly and citrus red mite are the most harmful citrus pests in Croatia, while graft-transmissible diseases, anthracnose, green and blue mould are major diseases. Republic of Croatia is the exporter of mandarin fruits and importer of orange, lemon and grapefruit fruits.

Keywords: lemon, mandarin, orange, pests, diseases, trade balance

1. Introduction

Several species of the *Citrus* genus are grown in the Republic of Croatia: mandarin (*Citrus reticulata* Blanco, *Citrus Unshiu* Marcovitch, *Citrus deliciosa*), orange (*Citrus sinensis* Osbeck), lemon (*Citrus limon* L.), grapefruit (*Citrus paradisi* Macf.), bitter orange (*Citrus aurantium* L.), pomelo (*Citrus grandis* L.) and citron (*Citrus medica* L.). Genus *Poncirus* is also important since its species *Poncirus trifoliata* L., Raf. is regularly used as a rootstock for the cultiva-

tion of citrus species, due to its winter hardiness [29, 26]. Kumquats from the *Fortunella* genus are grown to minor extent: only few hundred plants as decorative trees in pots [13].

The possibility of cultivation and the dispersal of individual citrus species have been determined by local eco-physiological conditions, in particular the frequency, duration and intensity of low temperatures [1, 22, 12]. The production area of citrus fruits in the Republic of Croatia is situated at the northern border of the subtropical belt (the 43rd parallel north), which limits the sustainable

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cultivation of most citrus species except *Satsuma* mandarins budded onto *Poncirus trifoliata* rootstock [29, 1, 17]. The introduction of Japanese mandarin *Satsuma* and the *Poncirus* rootstock in the coastal Adriatic region was largely promoted by Bobanović at the beginning of the 1920s [4]. The cultivation of Japanese *Satsuma* varieties (*Unshiu*) began in the 1930s, with the more intensive expansion from the 1960s [1]. *Satsuma*- group of cultivars has become the most commonly grown mandarins in Croatia, due to their winter hardiness (they can withstand shorter cold periods of up to -10°C), [17]. In terms of fruit ripening, the following cultivars are to be distinguished: very early cultivars: 'Ichumare', 'Wakiyama' 'Zorica' (Croatian cultivar, vegetative mutant of 'KowanoWase') and 'Chahara', early cultivars: 'Okitsu' and 'KowanoWase', mid-season cultivars: 'Saigon', 'Kuno' and 'Seto', and late cultivar 'Owari' [25]. Other citrus species (lemon, sweet orange, bitter orange, grapefruit, citron) have been cultivated for centuries, but at very limited scale in the protected locations of particular monasteries, castles, mansions and gardens. Unlike *Satsuma* mandarins, there are no intensive plantations in Croatia, since these species are less resistant to low winter temperatures [1].

The objective of the paper is the analysis and presentation of the citrus planting material production, fruit plantations, difficulties and risks related to diseases and pests, national citrus trade balance, and the proposal of measures to improve the citrus fruit sector.

2. Material and methods

Source of information: database of the Croatian Centre for Agriculture, Food and Rural Affairs/Institute for Seed and Seedlings, Institute for Plant Protection, and Institute for Pomology [13], Croatian Chamber of Commerce [7], Paying Agency for Agriculture, Fisheries and Rural Development (Paying Agency) – LPIS [24], and Central Bureau of Statistics [5]. Input and data processing, analysis and graphical analysis of the results were carried out in Excel 2010.

3. Results and discussion

3.1. Planting material production

A total number of 1,494,010 citrus plants were produced in the nineteen-year period (1999-2017) in the Republic of Croatia. Annual production of planting material ranged from 38,765 to 138,912 plants. The average annual production of fruit plants amounts to 78,630 citrus plants. In addition, the Republic of Croatia annually imports about 5,000 citrus plants: mandarins > lemons > oranges > grapefruit [13]. The most common species in the planting material production is mandarin (758,797), followed by lemon (500,927), orange (188,212) and grapefruit (46,074), (figure 1). The most commonly produced rootstock is *Poncirus trifoliata*, with a share of 95.43% (data not shown). When it comes to the category of plant material produced, in the first seventeen years the only category was CAC (Conformitas Agraria Communitatis) ie reproductive planting material and plants that met the minimum requirements specified for this category. In the last two years, the share of certified planting material was 12.5% (in 2016) and 21.2% (in 2017).

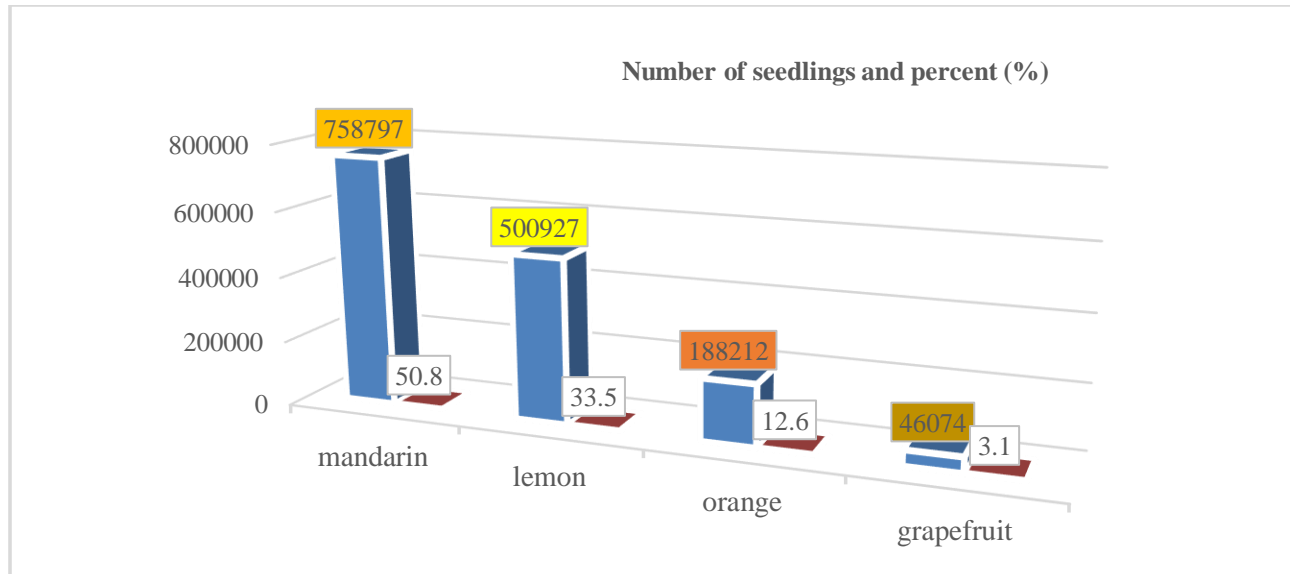


Figure 1: Total number of citrus seedlings produced in the Republic of Croatia in the nineteen-year period (1999-2017) and percentage (%) of each species

The most commonly produced mandarin was the ‘Chahara’ cultivar (30.5%) followed by the Croatian cultivar ‘Zorica’ (16.1%). The share of the latter in the last five years was ranging between 20 and 25%, with a tendency of growth. The most represented early cultivars were ‘Okitsu’ and ‘KowanoWase’, while the most represented mid cultivar was ‘Saigon’. The interest for the very early *Satsuma* mandarin cultivar ‘Ichumare’ has been increasing during the past ten years, as well as the production of plant material and the plantation area. In addition to *Satsuma*-group of cultivars, the clementines (*Citrus clementina* Hort. ex Tan) have been produced, whereby the share in the production of plant material has increased from 4.7% to 11% over the past decade. In other citrus species the most commonly produced cultivars in terms of plant material were as follows: orange: ‘Washington Navel’ (66.3%); lemon: ‘Meyer’ (46.7%) and grapefruit: ‘Natsumikan’ (72.7%), [13].

The selection of citrus cultivars in the Republic of Croatia is characterised by old cultivars. In mandarin, the most important citrus species, for more than half a century there has been no pre-introduction- or introduction process to revital-

ize the variety range with the new, economically valuable cultivars. In addition to the need to establish the pre-introduction of varieties, it is also necessary to test new rootstocks, seeing that poncirus is currently represented by more than 95%. Besides its positive characteristics (winter hardiness, CTV-tolerant) it also has some limitations: insufficient tolerance to *Phytophthora* and the response to the type of soil (chlorides and calcium). The production of plant material is mainly at the level of the CAC category (minimum conditions) in the open fields and often in the areas of intensive citrus production, which increases the risk of plant material infections.

It is necessary to work on the improvement of the health status of the planting material (the certification) of the most important *Satsuma* group (‘Chahara’, ‘Zorica’, ‘Ichumare’, ‘Okitsu’ ‘KowanoWase’, ‘Saigon’) and to have the production of planting material in nethouses and greenhouses, as well as in isolated areas outside the commercial citrus plantations. Phytosanitary status of plants in nurseries and production plantations is high on the priority scale [10].

3.2. Production plantations

According to the Paying Agency for Agriculture, Fisheries and Rural Development (Paying Agency)-LPIS /Land Parcel Identification System/ [24], there are 1,124,102 ha of agricultural land recorded in the ARKOD system in the Republic of Croatia. The share of fruit orchards in the total agricultural land area amounts to 2.31%, citrus fruits 0.17%, nuts 0.49%, mixed permanent crops 0.19% and olive groves 1.60%. There are 1,885.60 ha of citrus plantations registered in the LPIS: mandarin 1,816.67 ha (96.34%), lemon 33.47 ha (1.78%), orange 33.39 ha (1.77%) and other species/grapefruit, hybrids/ 2.06 ha (0.11%), (figure 2). The disproportion between the large number of produced lemon seedlings (fig 1) and ha plantations under lemon is due to the fact that most seedlings are planted and grown in pots (hobby cultivation). The most

common rootstock in the production plantations is *P. trifoliata* (95.23%), followed by *C. aurantium*, *C. reshni* (*Cleopatra*), *C. volkameriana*, *Troyer Citrange* and *C. sinensis* (data not shown). The five most frequently cultivated mandarin cultivars are ‘KowanoWase’ (25.3%), ‘Zorica’ (21.3%), ‘Chahara’ (21.1%), ‘Owari’ (10.4%) and ‘Okitsu’ (8.2%). The most common orange cultivar is ‘Washington Navel’ (80.9%) while the most cultivated lemon cultivar is ‘Meyer’ (58.4%). When it comes to productive areas of permanent crops (excluding olives and grapevines), citrus fruits come sixth (apple, plum, walnut, hazelnut, sour cherry, citrus (mostly mandarin), peach, sweet cherry, pear, ...). The most productive citrus growing area is located in the Mediterranean part of Croatia in the Dubrovnik-Neretva County (97.93%).

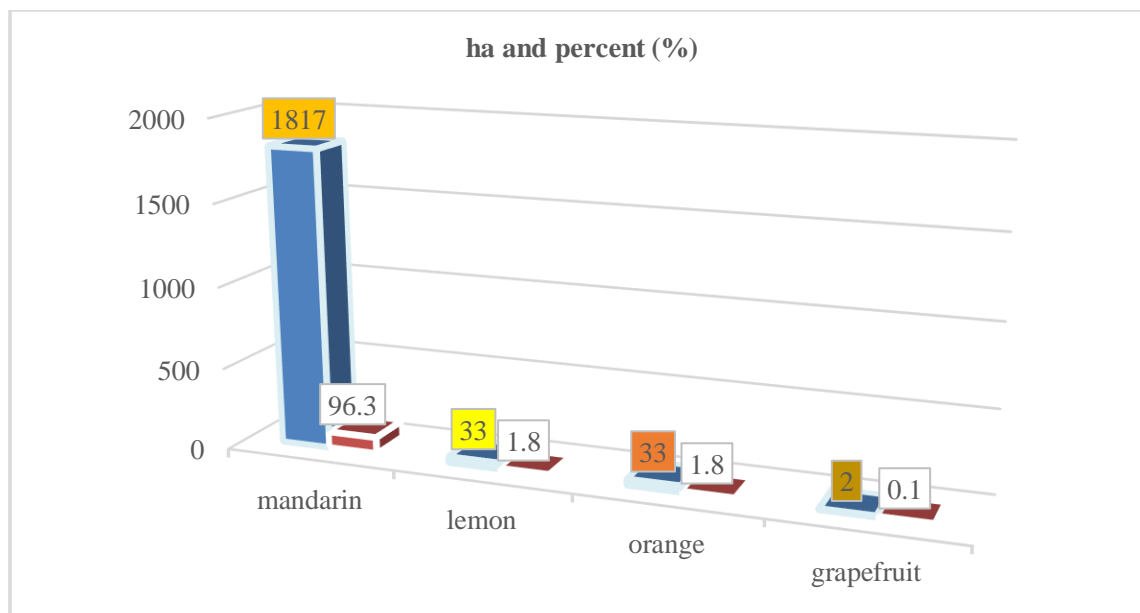


Figure 2: Citrus production plantations: presentation by species (ha) and percentage (%) of each species (2018)

According to the data of the Central Bureau of Statistics [5] for the period 2000 – 2016, the area of orange and lemon plantations has been decreasing, while the area of mandarin plantations has been increasing. The same trends are evident in the volume of fruit production of these spe-

cies, CBS, 2018 [5]. The average annual production of mandarin fruit in the Republic of Croatia in the seventeen-year period was 34.8 thousand tons, of which 54% was exported. The share of exported mandarin fruit augmented to 64.2% in the last ten years (30.70 thousand tons annual-

ly). According to ten-year production data for small citrus fruits (Clementins, Satsumas, Mandarins) Croatia is in 4th place in EU with an average production of 44.21 thousand tons (Eurostat 2021), followed by slightly smaller producers: Cyprus, Portugal and France [14]. The proposal of measures to improve the citrus sector should include more components: sector of nursery [10,30], technology of production [6,18] and sustainable fertilization/production and environmental protection [19].

3.3. Citrus pests and diseases

The occurrence of citrus pests in Croatia is typical for the Mediterranean Basin and it shares many similarities with the other Mediterranean countries. Mediterranean fruit fly (*Ceratitis capitata*) is currently the most important pest of citrus fruits in the Neretva Valley, the main citrus-growing area in Croatia [2]. Sterile Insect Technique (SIT) is developed as a method for *C. capitata* control in the Neretva Valley [3]. In certain locations of Southern Dalmatia where SIT nor chemical control measures are applied, up to 100 % of citrus fruit attacked by Mediterranean fruit fly can be recorded in some years. Citrus whitefly (*Dialeurodes citri*) is widespread in all citrus-growing areas in Croatia and is an important pest in the country [31]. Citrus leaf miner (*Phyllocnistis citrella*) is not considered as a major pest, but the attacks in young orchards and in nurseries can be relatively severe. Thrips damage on citrus fruits can be observed sporadically in certain seasons and on particular locations. *Thrips major*, *T. tabaci* and *T. meridionalis* are found to be the most common species occurring on citrus [27]. Aphids occurs regularly in all citrus-growing areas. *Aphis spiraecola*, *A. gosypii* and *Toxoptera aurantii* are species recorded on citrus crops [11]. Scale insects are by far more important citrus pests in Croatia than thrips and aphids. Totally 18 species belonging to Coccidae and Pseudococcidae have been identified on citrus plants [20]. Grey citrus scale

(*Coccus pseudomagnoliarum*) is regarded as the most damaging [21]. High populations of citrus red mite (*Panonychus citri*) are especially evident in extremely hot and dry summers, which have become more often during the last decade. Citrus bud mite (*Aceria sheldoni*) and pink citrus rust mite (*Aculops spelekassi*) also occur [23], but are of minor importance.

Citrus diseases in Croatia are generally less studied than citrus pests and it is hard to estimate their economic impact on citrus production. One of the major constraints of citrus production improvement in Croatia is a lack of virus-free planting material. Among graft-transmissible pathogens, *Citrus tristeza virus* (CTV) is known to be widespread in all citrus-growing regions in Croatia. As CTV-tolerant poncirus (*Poncirus trifoliata*) is practically the only citrus rootstock used in Croatia, symptoms of CTV infections mostly remain latent, despite the presence of severe stem-pitting, seedling yellows and recombinant CTV strains [9]. *Citrus exocortis viroid* (CEVd) is associated with bark cracking and bark shelling symptoms on *P. trifoliata*, visible especially in older orchards in the Neretva Valley [28]. Green mould (*Penicillium digitatum*) and blue mould (*P. italicum*) are regarded as the most important fungal diseases. Black rot (*Alternaria alternata*), anthracnose (*Colletotrichum gloeosporioides*) and grey mould (*Botrytis cinerea*) were also recorded on citrus fruits [16]. Anthracnose caused by *C. gloeosporioides* seems to be a re-emerging disease of increased importance in Croatia during the last decade [15]. Septoria leaf spot (*Septoria citri*) is relatively common, but of very minor importance. Gummosis and foot rot caused by *Phytophthora* species are present and restricted to particular localities [8]. Mal secco (*Phoma tracheiphila*) and citrus stubborn (*Spiroplasma citri*), present in other Mediterranean countries, have never been confirmed in Croatia.

3.4. National trade balance of fresh- and processed fruit

An analysis of exports and imports of fresh or dried citrus fruit was made based on the twelve-year data of the Croatian Chamber of Commerce (2005-2016)[7], in respect to customs tariff CT-0805 (mandarin/clementine, orange, lemon, grapefruit, lime, other fresh or dry citrus fruit). The analysis includes the calculation of the volume (t) and the respective financial values (US \$) for the mentioned products being exported from or imported into the Republic of Croatia. Figure 3 indicates that the Republic of Croatia has a negative trade balance. The average annual deficit taking into account all types of citrus fruits is minus 16,120 t, which amounts to minus 20,627,177 US dollars (figure 4). It is indicated in the introduction of the paper that the Republic of Croatia has significant eco-physiological restrictions regarding the production of citrus fruit (e.g. the intensity and frequency of negative winter temperatures), determining the possibility of citrus cultivation - in our case the *Satsuma* mandarin. The mandarin makes up 97.3% of the volume of citrus export (t), which corresponds to 96.2% of the export value (US \$). Mandarin has been exported to the countries of Central and Western Europe, and to Russia (prior to the re-

cent trade embargo). The average export price of mandarin is US \$ 689.4 per tonne. The production-consumption balance shows the self-sufficiency of mandarin. However, the external trade balance in citrus fruits over the last twelve years is negative due to the prevalent imports of other citrus species (orange, lemon, grapefruit, lime) and mandarin outside national production season.

Orange is the most commonly imported citrus fruit (54.2%), followed by lemon (22.4%) and mandarin (10.3%). The remaining 13% comprises of grapefruit, lime and other fresh or dried citrus fruits under CN 08059000. The average value of all citrus fruits imported is US \$ 863.66/t, owing to an average import price of lemon of US \$ 1,076.7/t. In the future, the Republic of Croatia will maintain the status of net importer of these citrus species, since it has no possibility of significantly affecting the eco-physiological conditions that currently inhibit the sustainable production of orange, lemon and grapefruit. Unlike other species, mandarin, primarily *Satsuma* mandarin, remains our product that is recognized and widely accepted by consumers in many countries of the region.

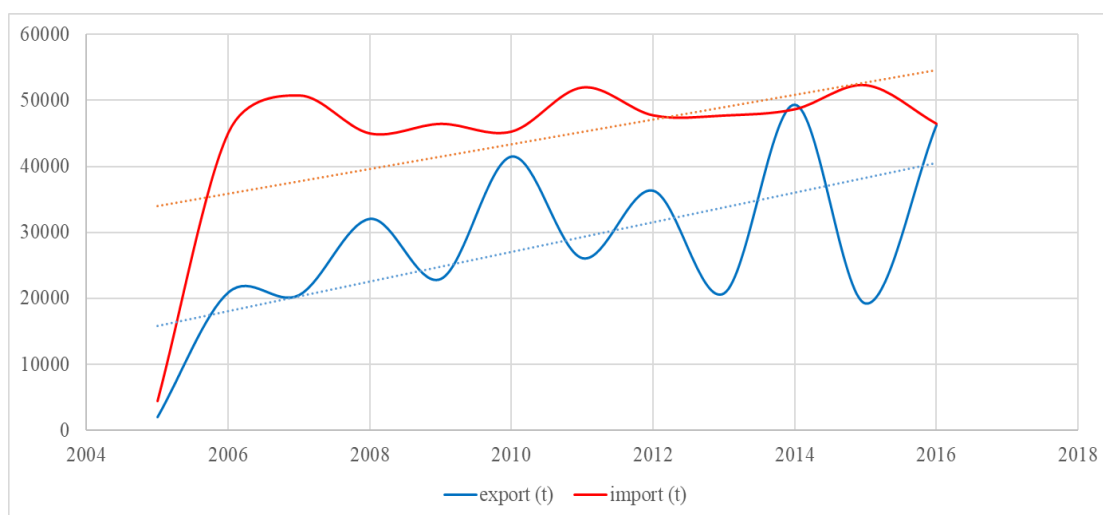


Figure 3: Volume of exported and imported fresh and dry citrus fruits (CT-0805) in t

Data source: Croatian Chamber of Commerce

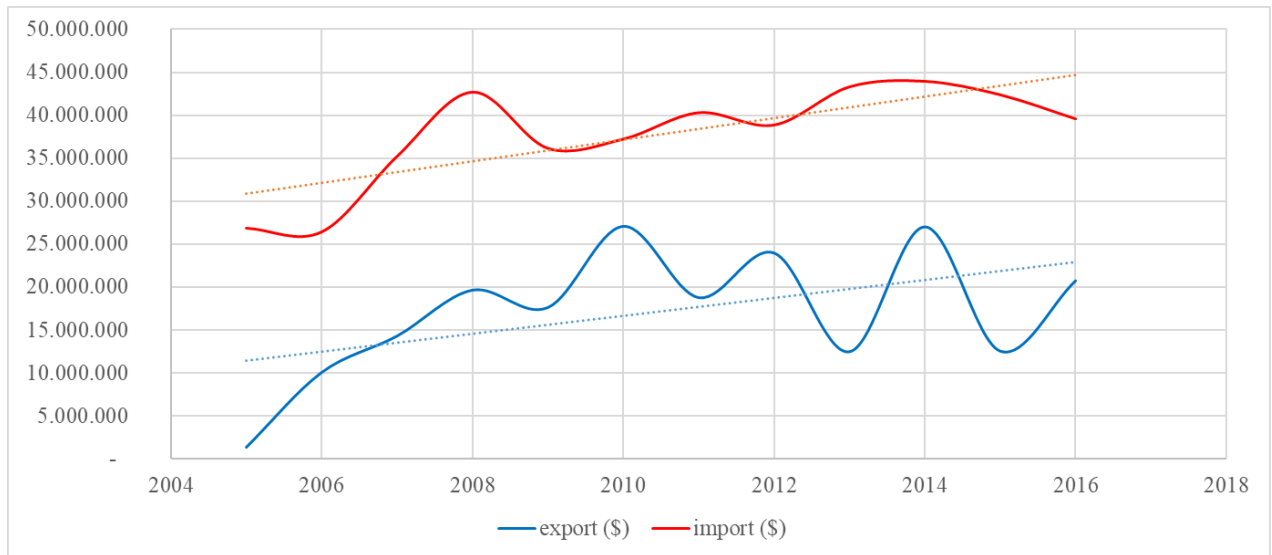


Figure 4: Value of exported and imported fresh and dry citrus fruits (CT-0805) in US\$

Data source: Croatian Chamber of Commerce

4. Conclusions

A selection of citrus fruit cultivars in the Republic of Croatia is characterised by very old cultivars, and of predominantly the CAC plant material category (low health status). It is necessary to carry out the pre-introduction- and the introduction procedures of the new citrus cultivars, in particular mandarin, and to include such *Satsuma* cultivars in the certification process which have so far proved to be economically valuable ('Chahara', 'Zorica', 'Okitsu', 'Kowano Wase', 'Saigon').

Based on the results of the pre-introduction and introduction trials, it is necessary to gradually introduce new mandarin cultivars, and to use certified planting material as well as modern cultivation technologies including irrigation technologies that have to this point been insufficiently applied.

Mediterranean fruit fly, grey citrus scale, citrus whitefly and citrus red mite are the most important citrus pests in Croatia, while graft-transmissible diseases, anthracnose, green and blue mould are major diseases. Integrated pest management in citrus crops is underdeveloped

and serious losses due to pests and pathogens still occur.

Republic of Croatia is a net exporter of mandarin fruits and importer of oranges, lemons and grapefruits. The production and consumption balance shows the self-sufficiency of mandarin production. However, the foreign trade balance of the Republic of Croatia for citrus has been negative for many years due to the prevailing import of other citrus species for which there are no favourable eco-physiological conditions for the cultivation and sustainable production.

5. References

1. Bakarić P: *Uzgoj mandarine Unšiu /Cultivation of Unshiu mandarin/* Stnica za južne kulture: Karlo Brzica; 1983. pp 9-13, 24-26, 56-59, 84-91 [In Croatian].
2. Bjeliš M, Pelicarić V: **Tephritid fruit fly pests in Croatia: an overview of damage and current control strategies.** Proceedings of 6th International Fruit Fly Symposium. 2002., 6-10 May, Stellenbosch, South Africa, 325-329.
3. Bjeliš M, Popović L, Kiridžija M, Ortiz G, Pereira R: **Suppression of Mediterranean**

- fruit fly using the Sterile Insect Technique in Neretva River Valley of Croatia. Proceedings of the 9th International Symposium of Fruit Flies of Economic Importance. 2016.,12-16 May 2014, Bangkok, Thailand, 29-45.
4. Bobanović M: **Nekejužne kulture**, Zemaljskogospodarskovijeće;1923.,Split, pp 28-43. [In Croatian].
5. Central Bureau of Statistics (CBS), **database for the period 2000 – 2016**https://www.dzs.hr/App/PXWeb/PXWebHrv/Menu.aspx?px_language=hr&px_type=PX&px_db=Poljoprivreda%2c+lov%2c+%c5%a1umarstvo+i+ribarstvo&rxid=fc9d580f-2229-4982-a72c-cdd3e96307d3
6. Chhetri L.B: **Intensive Fruit Cultivation Technology of Citrus Fruits: High Density Planting: A Brief Review**. Journal of Agricultural Studies 2019, **7**(2):63-74.
7. Croatian Chamber of Commerce; **database: 2005-2016**. <https://www.hgk.hr>
8. Cvjetković B:**Mikozeipseudomikozevoćaka i vinove loze**/Fungal and Oomycete diseases of fruits and grapevine. Zrinski d.d., Čakovec, Croatia;2010. [In Croatian].
9. Černi S, Škorić D, Ruščić J, Krajačić M, Papić T, Djelouah K, Nolasco G:**East Adriatic – a reservoir region of severe Citrus tristeza virus strains**. European Journal of Plant Pathology 2009,**124**: 701-706.
10. Černi S, Hančević K, Škorić D: **Citruses in Croatia – cultivation, major virus and viroid threats and challenges**.Acta Bot. Croat. 2020, **79**(2): 228-235.
11. GotlinČuljak T., Grubišić, D., Mešić, A., Juran, I.**List of aphids (Homoptera: Aphidoidea) and their host plants in Croatia**. Natura Croatica2012,**21**: 191-221.
12. Gugić J., Cukrov L:**Pregled stanja i perspektiva razvoja hrvatskog agrumarstva /Status overview and prospects of citrus growing in Croatia/ Pomologia Croatica 2011,****17**(3-4): 115-133. [In Croatian].
13. HCPHS (Croatian Centre for Agriculture, Food and Rural Affairs) **database 2000-2020**.<https://www.hcphs.hr/zsr-3/publikacije/>
14. https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/market-observatories/fruit-and-vegetables/citrus-fruit-statistics_en
15. Ivanović A, Popović L, Ivić D, Bjeliš M:**Citrus anthracnose (Colletotrichum gloeosporioides (Penz.) Penz. & Sacc.) in Croatia**.Glasnik Zaštite Bilja2013, **6**: 38-42. [In Croatian].
16. Ivić D, Popović L, Roglić A, Bjeliš M:**A record of postharvest black rot, anthracnose and grey mould on mandarin fruits**.Agronomski Glasnik2014, **1-2**:83-94. [In Croatian].
17. Kaleb M: **Razvoj uzgoja mandarina i ostalih agruma u dolini Neretve /Development of mandarin culture and other citrus species in Neretva valley**Agronomski glasnik2014, **4-5**:219-238. [In Croatian].
18. Kumar S, Awasthi O P, Dubey A K, Dahuja A, Singh A:**Influence of rootstocks on growth, yield, quality and physiological activity of ‘Kinnor’ mandarin grown in a semi-arid region**. Fruits **74**(5), 205–213 | ISSN 0248-1294 print, 1625-967X online | <https://doi.org/10.17660/th2019/74.5.1>
19. Li Y-J, Yang M, Zhang Z-Z, Li W-L, Guo C-Y, Chen X-P, Shi X-J, Zhou P, Tang X-D, Zhang Y-Q: **An Ecological Research on Potential for Zero-growth of Chemical Fertilizer Use in Citrus Production**

- in China. *Ekolozi* 2019, **28**(107): 1049-1059.
20. Masten Milek T, Šimala M: **The scale insects (Hemiptera: Coccoidea) on citrus plants in Croatia**. Proceedings of 10th Slovenian Conference on Plant Protection with international participation 2011, 1-2 March 2011, Podčetrtek, Slovenia, 632(082) **1-2**: 273-277.
21. Masten Milek T, Markotić V, Šimala M, Pintar M: **Gray citrus scale [*Coccus pseudomagnoliarum* (Kuwana, 1914)] – economically important pest of citrus**. *lasilo Biljne Zaštite* 2017, **17**: 548-556. [In Croatian].
22. Miljković I: **Hrvatsko voćarstvo pred novim odrednicama/New guidelines in fruit growing in Croatia**. *Agronomski glasnik* 1996, **58**(2-4): 123-141.
23. Oštrec Lj: **Zoologija: Štetne i korisne životinje u poljoprivredi/ Zoology – harmful and beneficial animals in agriculture**. Zrinski, Čakovec, Croatia; 1998. [In Croatian].
24. PAAFRD: Paying Agency for Agriculture, Fisheries and Rural Development (Paying Agency), **ARKOD: a national system of identification of land parcels and the use of agricultural land in Croatia** (Land Parcel Identification System) – LPIS. 2018, <http://www.aprrr.hr/>
25. Popović L, Vego D: **Sortiment mandarina u području Opuzena/ Mandarin varieties in Opuzen/Pomologia Croatica** 2010, **16**(3-4): 89-107. [In Croatian].
26. Rošin J, Hančević K, Radunić M: **Predosnovni matični nasadi agruma/ Preliminary Citrus Mother Block/Pomologia Croatica** 2009, **15**(3-4): 129-140. [In Croatian]
27. Šimala M, Pintar M, Masten Milek T, Markotić V, Bjelja Ž: **The results of a survey of quarantine thrips species from genus *Scirtothrips* Shull, 1909 on citrus in Croatia**. *Glasilo Biljne Zaštite* 2017a, **17**: 524-538. [In Croatian].
28. Škorić D, Černi S, Krajačić M: **Viroids – causal agents of plant diseases**. Book of abstracts of 47th Symposium of Plant Protection 2003, 11-14 February 2003, Opatija, Croatia, 37.
29. Tabain F: **Uzgoj agruma/Citrus fruit cultivation; Znanje Zagreb** 1975, pp 13-14, 47-48, [In Croatian].
30. Vashisth T, Chun C, Ozores-Hampton M: **Florida Citrus Nursery Trends and Strategies to Enhance Production of Field-Transplant Ready Citrus Plants**. *Horticulturae* 2020, **6**(1): 8 <https://doi.org/10.3390/horticulturae6010008>
31. Žanić K, Igrc-Barčić J, Kačić S: (2001). ***Dialeurodes citri* (Ashmead, 1885) in the Adriatic region of Croatia**. *Agriculturae Conspectus Scientificus* 2001, **66**(3): 161-168.