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CURRENT STATUS OF THE MEDITERRANEAN FRUIT FLY IN MONTENEGRO

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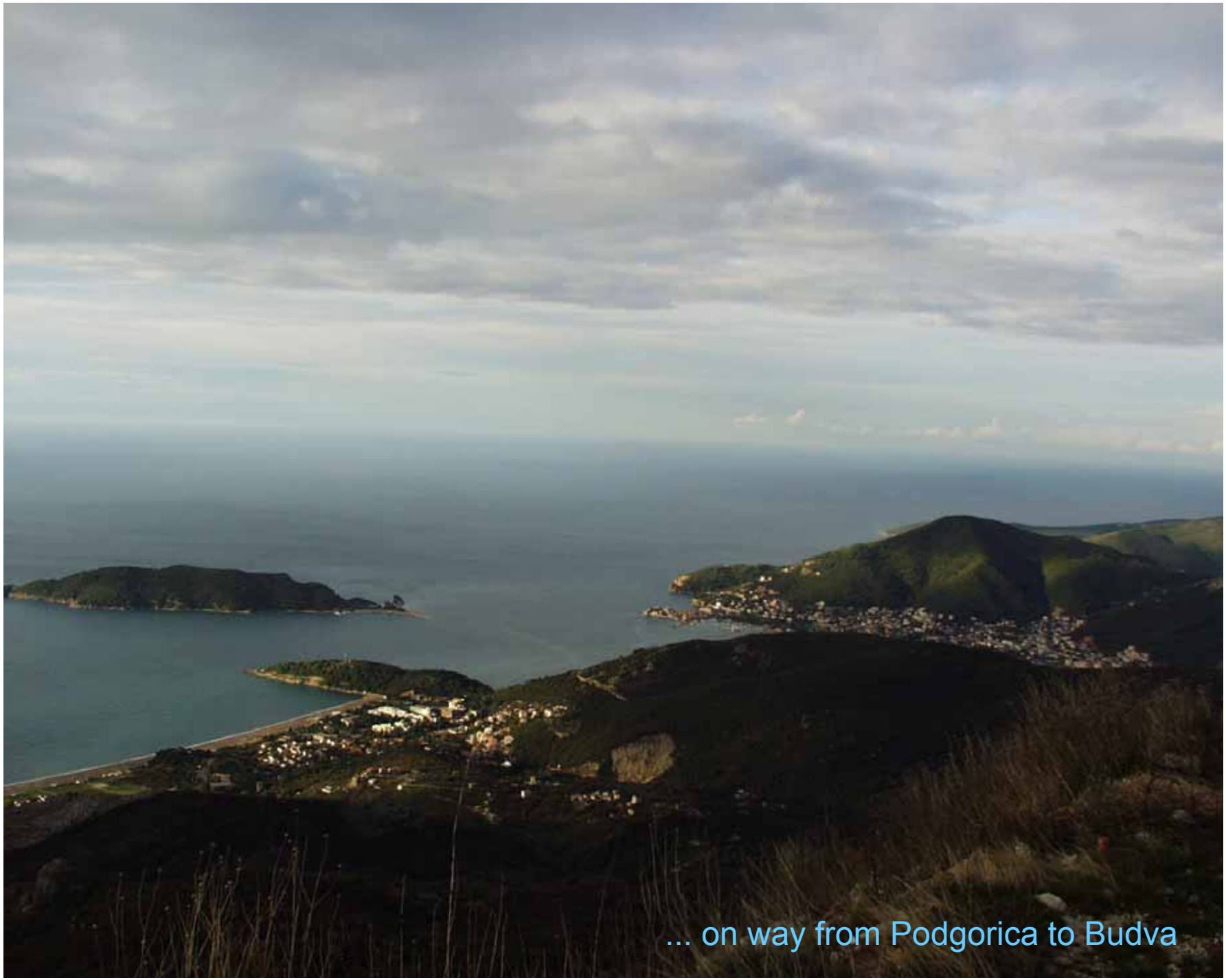
Montenegro INTRODUCTION

- Montenegro is located in southeastern Europe (West Balkan).
- It has 298 km long coast on the Adriatic Sea located between $41^{0}52`$ and $42^{0}29`$north latitude.

- Montenegro coast borders with Croatian and Albanian coast.

- The coast is a narrow strip, separated from the hinterland by the karstic mountains which protect it from the cold air flows.
- Due to its favorable geographic position and Mediterranean climate, Montenegro coast is suitable for fruit and vegetable production.


Morinj, Boka Kotor Bay


... on way from Podgorica to Budva

- The most important tree fruit crops are olive and citrus (mainly mandarins).
- Although figs, persimmons, pomegranate, kiwi, sporadically apples, pears and stone fruits (peaches, cherries, plums) are present, they are of less or without economic importance.
- They are mainly grown in backyards or small orchards.

- Majority of Montenegro fruit production along the coast is characterized by small, mixed, family orchards, with the most abundant mandarins (from tens up to few hundreds of trees) and almost as a rule certain number of fig or persimmon trees nearby mandarins.

- The most important mandarin production is particularly located around cities Bar and Ulcinj.
- Plantations have from few hundreds up to few thousands trees.
- This is also the main orange production area.

The Mediterranean Fruit Fly in Montenegro

- The Mediterranean fruit fly has been considered as an established pest in Montenegro coast for more than 10 years.

- Although present in Mediterranean region for more than a century, it was not officially confirmed as established pest in Montenegro until 2002.
- All previous records in low population level were considered as occasional outbrakes:
  - 1988 -1990: area of Bar and Ulcinj in citrus plantations
  - 1991-1995 no presence were detected (with exception in 1992).
  - 1998 - mandarins, locality in the Boka Kotor Bay.

- After severe infestations in mandarin plantations in 2000 and 2001 in area of Ulcinj and Bar, distribution, host plants and population dynamic of *C. capitata* started monitoring from 2002.

Monitoring

- Different lures were used since 2002 ……

angelica seed oil
(2002-2003)

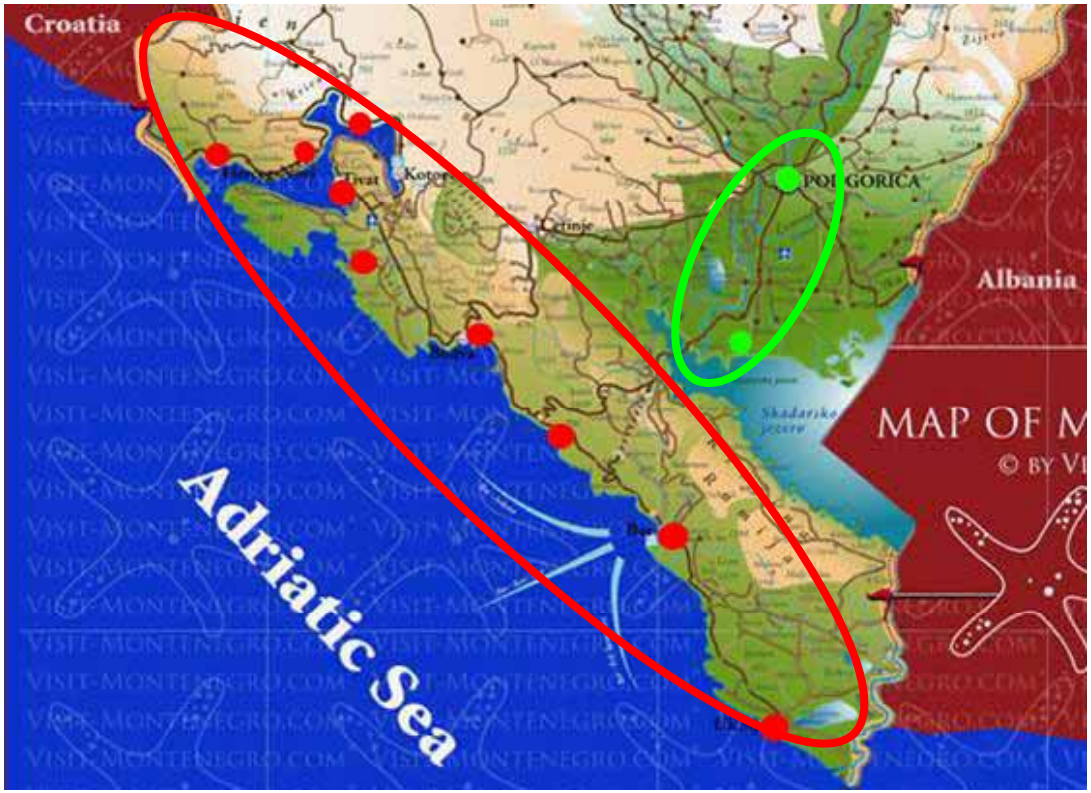
Trimedlure (2004-2006)

Buminal+diammonium hydrogen phosphate 4:1 (2006-2008)

From 2008 only 3 component female-targeted attractant (ammonium acetate, trimethylamine and putrescine) in Tephri traps has been used.

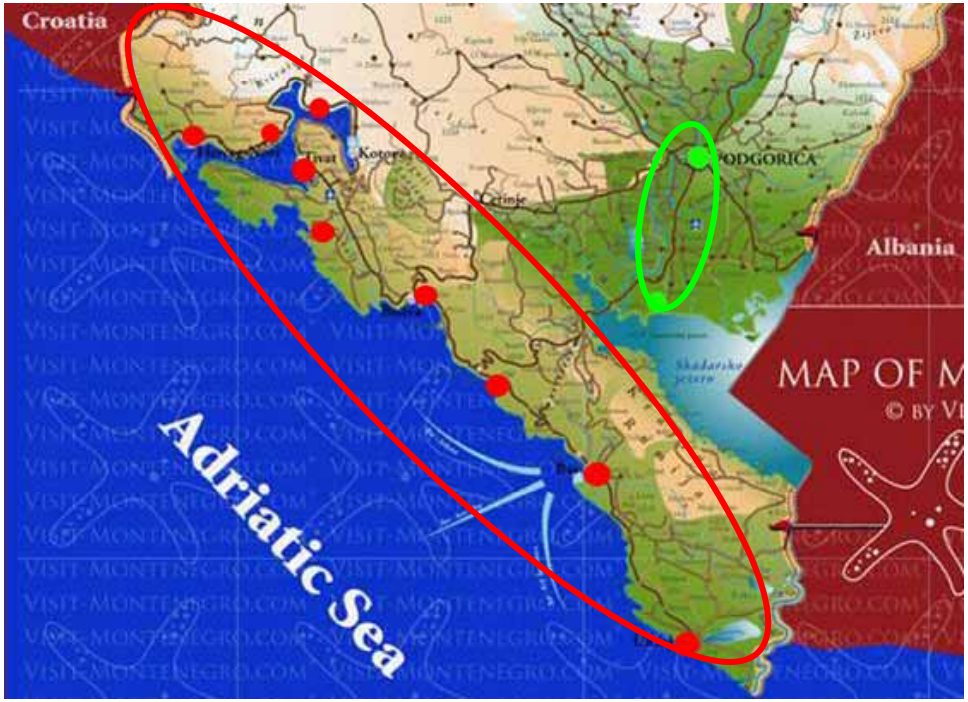
DISTRIBUTION of *C. capitata* in Montenegro

- Initially, presence of *C. capitata* was restricted to the coast.
- In inland it was detected for the first time in surrounding areas of the city Podgorica in 2008 and around Skadar Lake in 2010.



HOST PLANTS

- Mandarins, oranges, lemon (cultivar Lunario), grapefruit, figs, persimmon, jujube and apples were confirmed as host plants.
- All this fruit species were found infested in the coast, while in area of Podgorica and Skadar Lake only persimmon and apples.



- Apples were detected as a new host plant in September 2010.

- Presence of suitable hosts with different time of ripeing (continuously from July to November/December) together with favourable climatic conditions (mediterranean climate) makes Montenegro coast suitable for *C. capitata* development.

- Since monitoring have started, infestation of mandarins (both early and late varieties), figs and persimmons were detected every year.
- Oranges are rarely attacked and infestation of lemon, grapefruit and jujube were recorded only in 2003 and 2007 when population level was high.

- In an economic sense, the most important host plant is mandarin (cultivar Unshiu).

AVAIBILITY OF HOST FRUITS

* the first infested fruits are figs (July and August), followed by...

* the earliest mandarin varieties (Wakyama, Chahara) in first half of September....

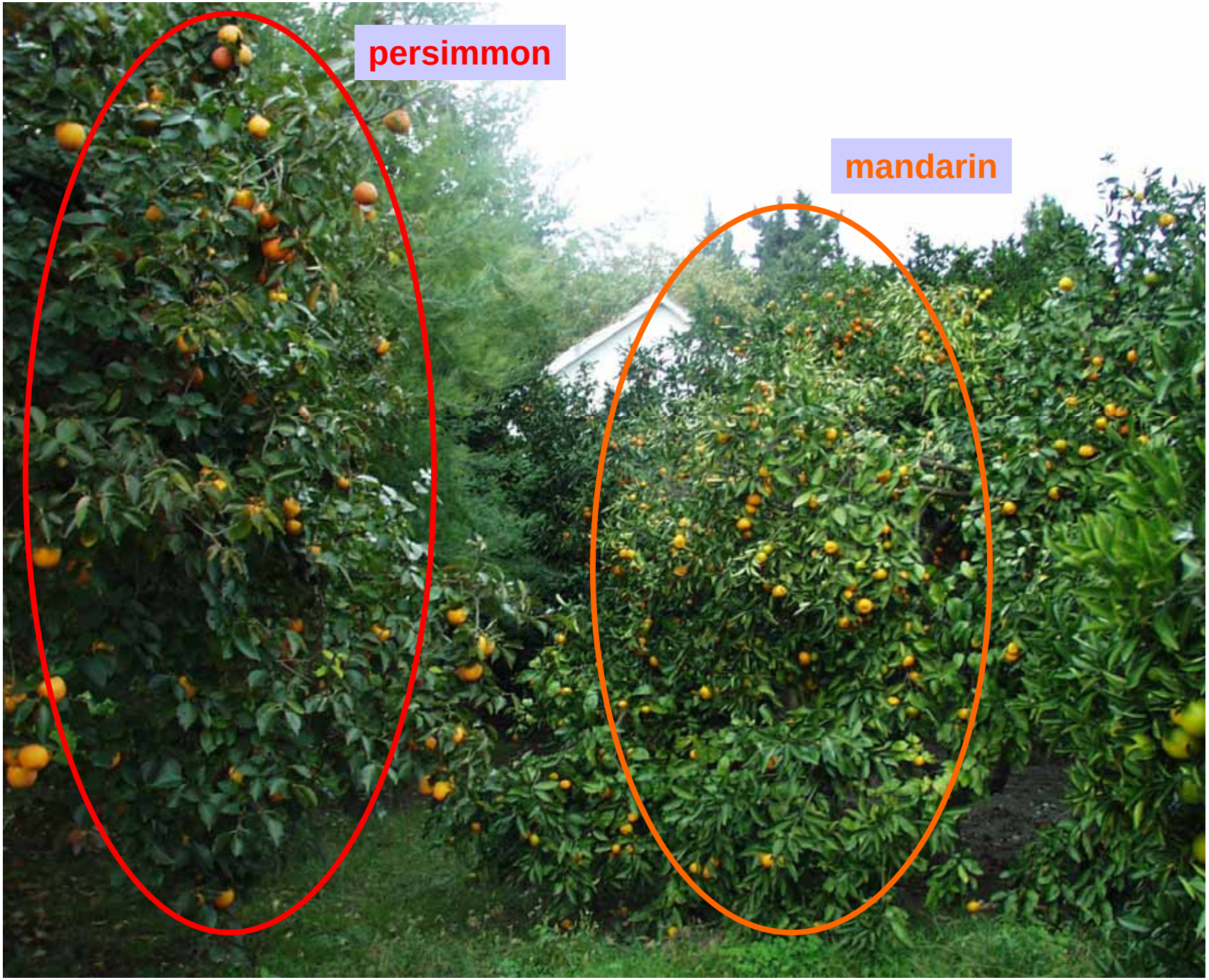
* early mandarin variety Kawano Wase (up to mid October)....

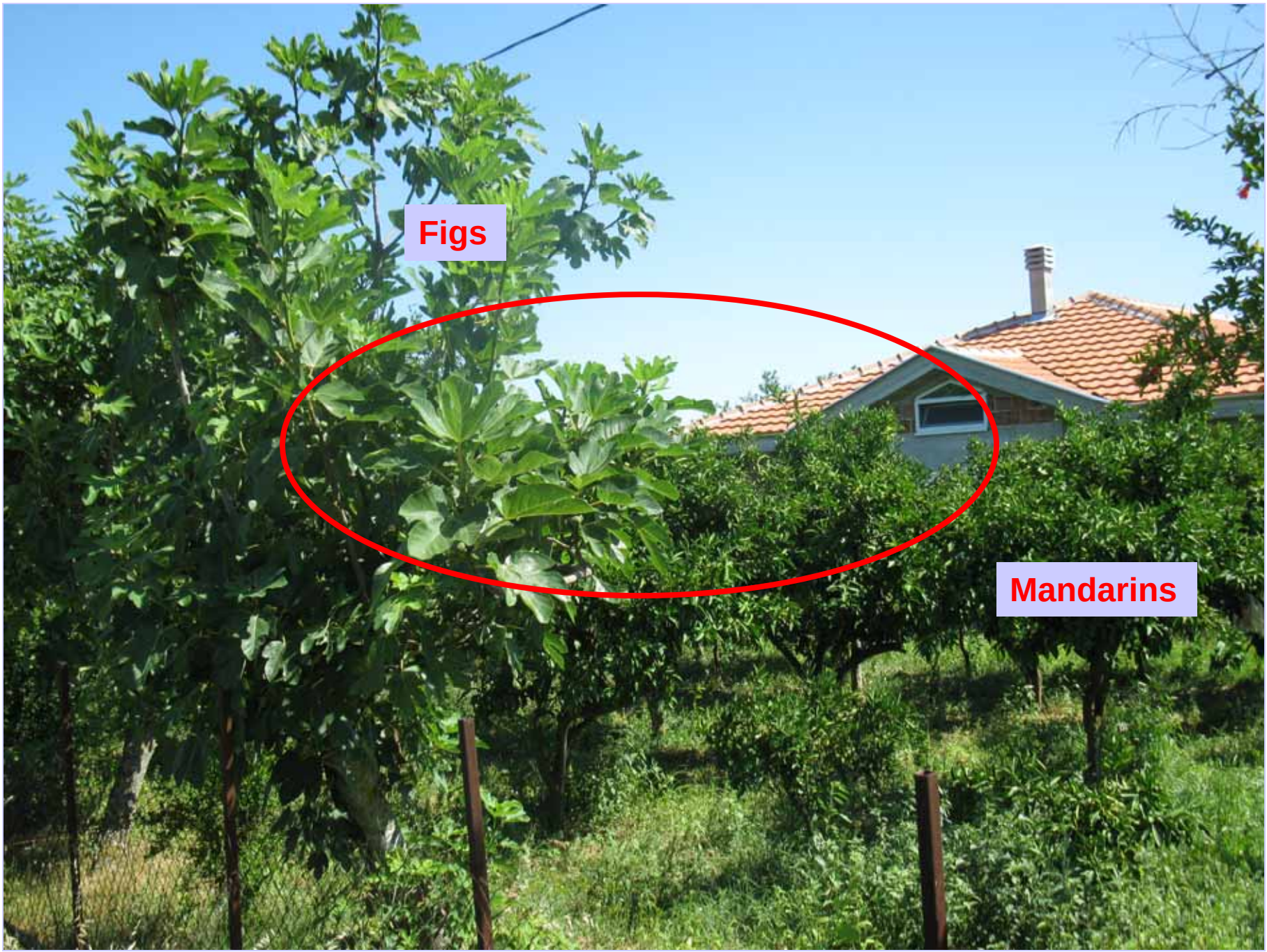
* perssimon (end of September-October)...

* late mandarin variety Owari (second half of October-mid November)..... and....

* oranges, as the latest ripeing fruits in a vegetation season, in period end November - beginning of December.

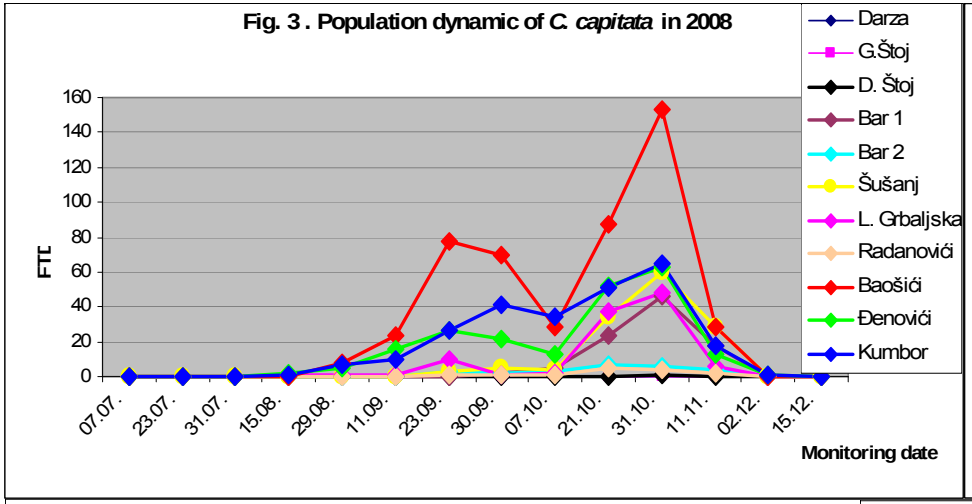
- Figs and persimmons has been confirmed as very important for breeding of the fly in early summer and early autunm.
- They are usually present nearby mandarin orchards with small number of trees and serves as reservoars for fly population maintaince before mandarins become suspectible.
- Farmers usually do not apply control measures against *C. capitata* on this plants because they are with no importance in an economic sense.

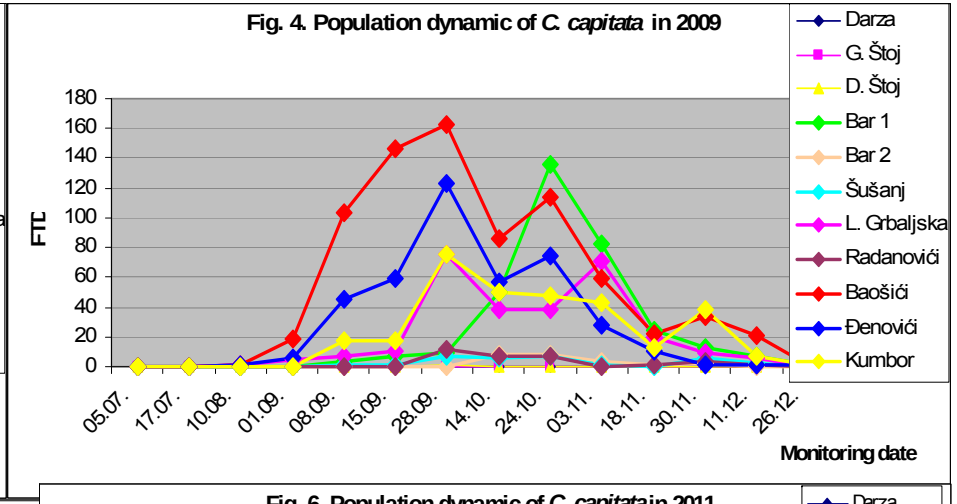

persimmon
mandarin

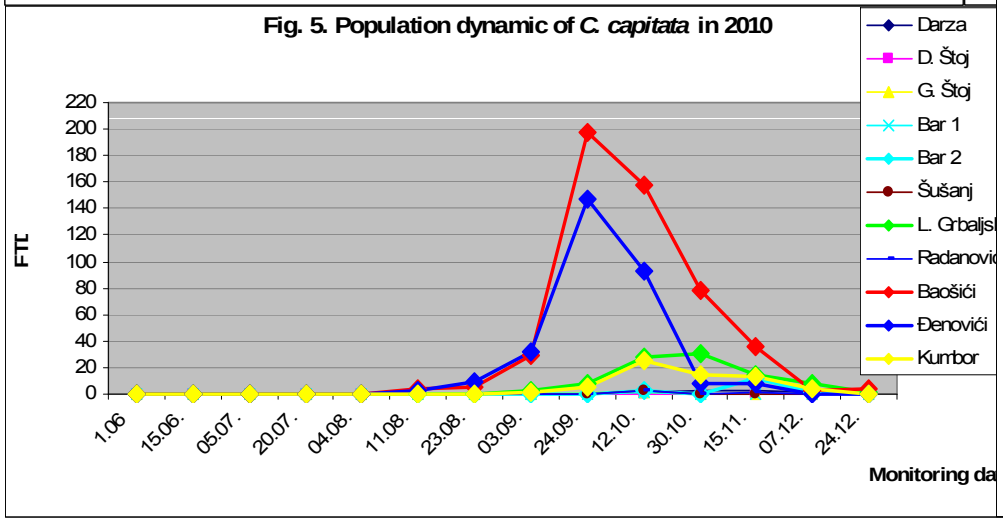

Figs
Mandarins

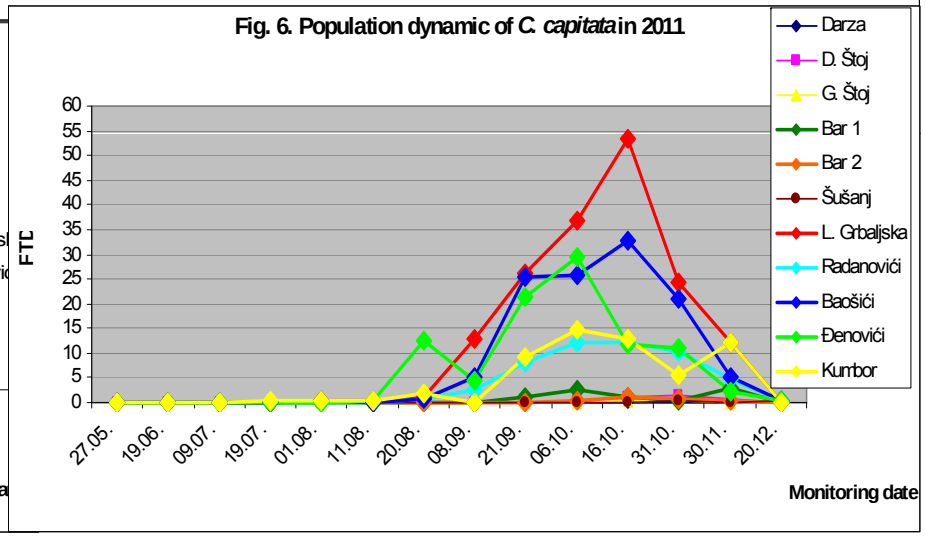
POPULATION DYNAMIC

- Results of four years monitoring with 3 component female-targeted attractant (ammonium acetate, trimethylamine and putrescine) (2008-2011) showed that along the coast first flies were detected in July with an exception in 2011 when the first fly was detected on 17 June.







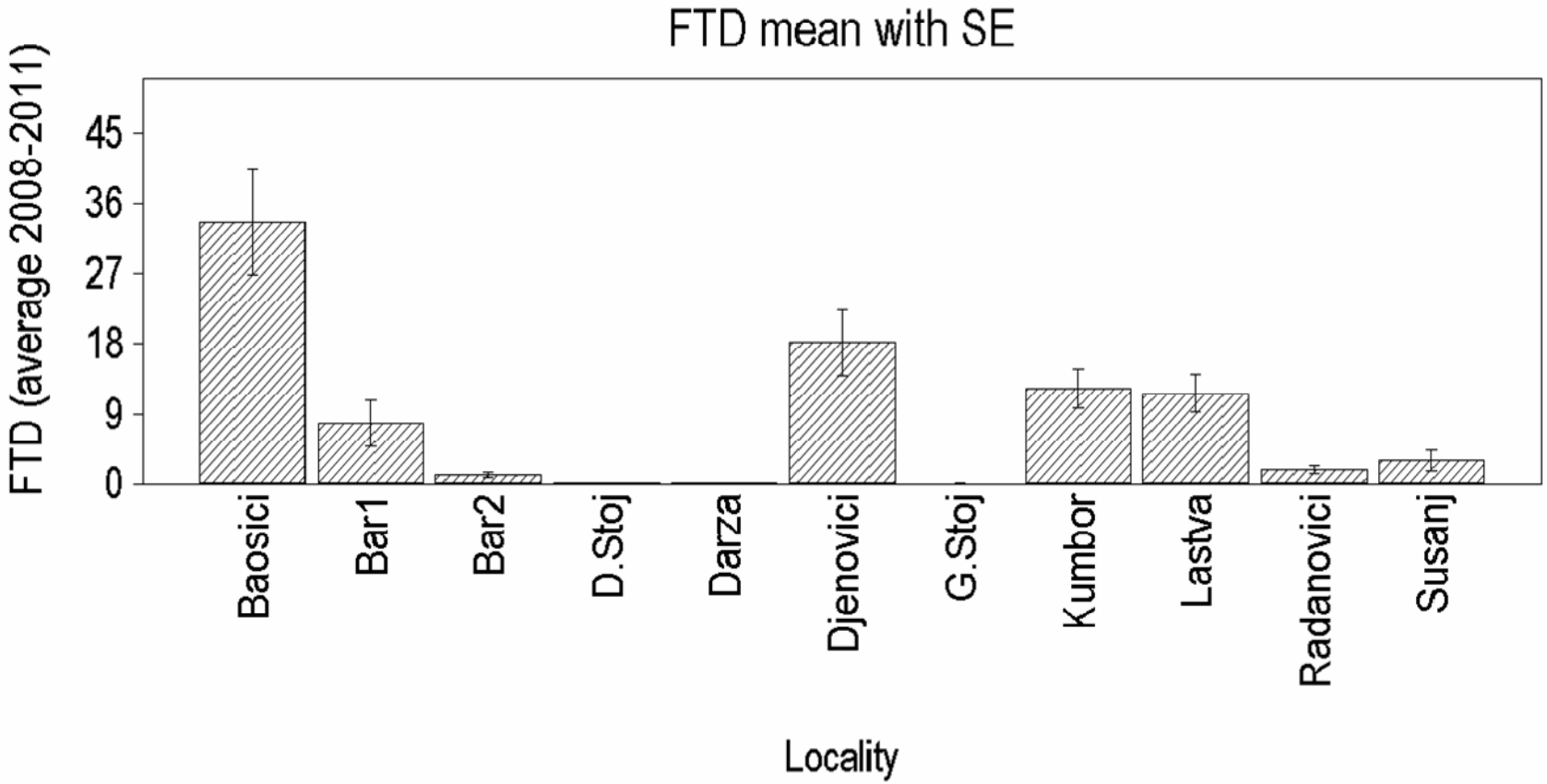


- Number of captured flies per trap per day (FTD) also indicated that after low capture rates in July and August, level of population reached peak from mid-September to end of October and started decreasing in November.

- Flies capture ending in December.
- No flies were detected between January and June/July.

- In 2008-2010 maximum FTD reached 153.3, 162.07 and 197.19 and was recorded in locality Baošići in the second half of October 2008 while in 2009 and 2010 in the last week of September.
- In 2011 maximum FTD was in locality Lastva Grbaljska - 53.5 in the second half of October.

- Results of monitoring also showed fluctuation of FTD depending on monitoring date and locality, with statistical significant differences in adult population density.



- In every year high population density was reached in localities of the Boka Kotor Bay (Baošići, Kumbor, Đenovići) and in Lastva Grbaljska which is approx. 40 km far in southeastern direction.

- In inland first captures were in August and September with low number until mid-November.
- During period of monitoring low number of captured flies was recorded.

Fig. 7. Population dynamic of *C. capitata* (Podgorica, 2008)

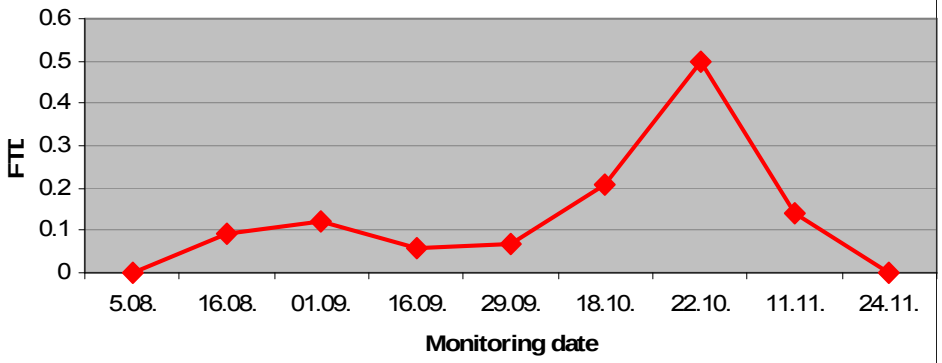


Fig. 8. Population dynamic of *C. capitata* (Podgorica, 2009)

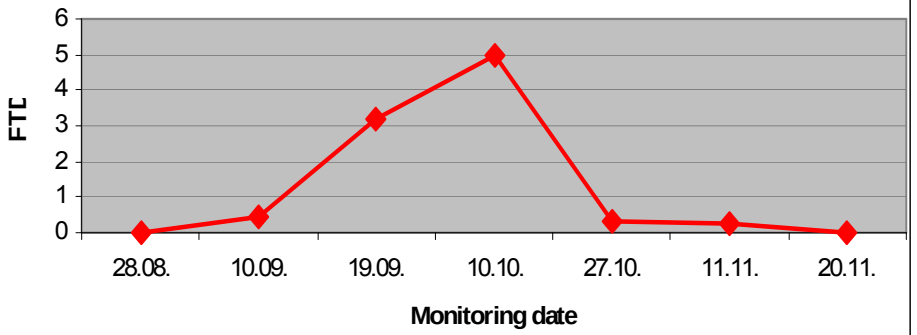


Fig. 9. Population dynamic of *C. capitata* (Podgorica, 2010)

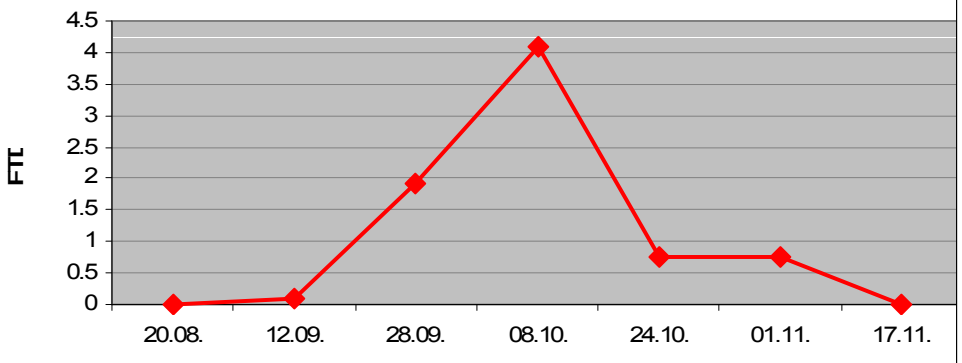


Fig. 10. Population dynamic of *C. capitata* (Podgorica, 2011)

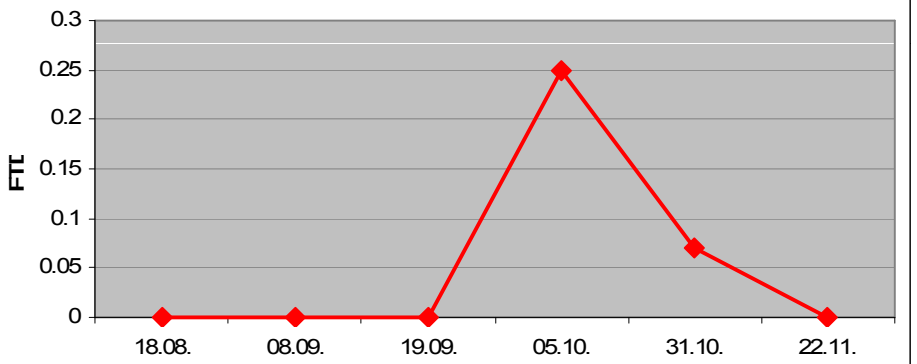
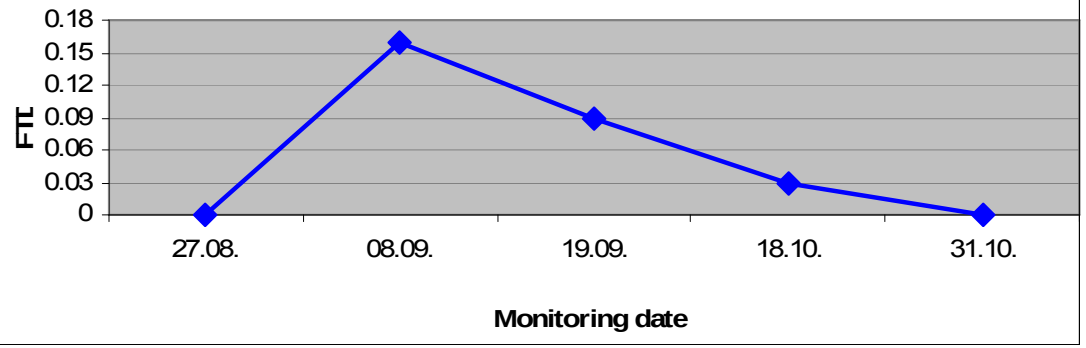


Fig. 11. Population dynamic *of C. capitata* (Godinje, 2011)



CONCLUSION

- Our findings suggest that *C. capitata* is established pest in Montenegro which has spread from the coast in inland and gradually increasing number of host plants.
- Period of adult detection is restricted up to 6 months and the earliest detection was in second decade of June.
- After low population level during July and August it starts increasing in September and reach the peak from mid September and October.
- The most important host plant is mandarin.

- In recent years the fly showed tendency to establish its population inland, particullary around city of Podgorica and area of Skadar Lake which are in climatic conditions very similar with the coast, as well in hosts presence.
- Regarding surrounding of Podgorica is the biggest and most important area for peach production in Montenegro, *C. capitata* could become a serious threaten for it.


Thank you for your attention