

Control of Medfly by SIT in the Nereva River Valley

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1. INTRODUCTION

The medfly, *Ceratitis capitata* Wied. is a pest of great economic importance in the area of Dalmacija region. It has been present in the littoral regions for over 50 years (Kovačević, 1960.). In some areas, such as southern part surrounding the city of Dubrovnik, the presence of the medfly precludes fresh fruit production, even when chemical control measures are applied (Bjeliš and Pelicarić, 2002.). To date, the medfly is present in the whole Dalmacija and in northern part of Istria (Pelicarić and Bjeliš 2002.). As it is often the case worldwide, optimum conditions for medfly are found in backyards where several host plants are grown, allowing the medfly to be present from late spring until the winter. Althow medfly was not managed in the past, some observations on possibilities for control by using attractant were done (Šimunić, 1960., Brnetić, 1969.)

The medfly has invaded the Neretva river valley, the most important mandarins, *Citrus reticulata* production area of Croatia. Depending on the area considered, the main hosts of the medfly in Croatia during the fruiting season are loquat, early fig varieties, stone fruits, late fig varieties, mandarin and kaki.

Benefits of using SIT for the area-wide suppression of the medfly have been investigated. The Neretva river valley (Curić, 1994.), as

well as some islands (Vis, Hvar, Brač and Elaphyte archipelago), are geographically isolated or have some isolated areas of interest and as such are highly convenient for the use of SIT (Bjeliš and Pelicarić, 2003.).

The Neretva river valley seems to be to date, the best candidate for an area-wide medfly suppression programme using the SIT. The whole valley represents 80% of the national citrus production. The valley has been classified as «international aquatic reserve», where more than 300 birds types has been recorded (Rucner, 1993.) and due to the presence of some other endangered aquatic species, and it is divided between Croatia and Bosnia & Herzegovina. For these reasons, the area-wide and transboundary use of SIT seems to be the most suitable solution for medfly suppression. Neretva Delta region is an area with the largest and most vaulable part of old Mediteranean wet-lands in Croatia (Markovčić, 2001.) and also one of few such areas preserved in Europe. This is a natural unit covering approximately total of 20.000 ha of land, from the area of the Hutovo Blato Nature Park (7.411 ha) in Bosnia and Herzegovina to spacious Neretva estuary (12.000 ha) in Croatia. Croatian part of the lower Neretva valley contains 7 protected localities covering 1,624 ha.

The possibilities for organic farming practice exist in small areas near the mountines that surround the valley, where water is not yet contaminated, such as Desne and Pojezerje areas in Croatia, as well as areas bordering Hutovo Blato Nature Park in Bosnia and Her-

zegovina. The cultures that can be cultivated by using principles of ecological agriculture in both parts are traditionally grown mediterranean and sub-mediterranean cultures such as citrus, japanese apple, kiwi, artichoke, figs, peaches, almost all represent host plants for medfly.

Since the medfly infestation still raise, the number of insecticide sprayings will increase and only environmental friendly methods such well developed SIT technique should be used together with other organic methods which would not disrupt the present natural balance (Bjeliš and Pelicarić 2003.). Baseline data collection on medfly biology is currently undergoing, and a study is planned with the support of the IAEA TC project for the period 2007-2008. year, to assess the technical and economic feasibility of an area-wide SIT-based medfly suppression program in the Neretva Valley.

2. AREA DESCRIPTION

All tasks were chosen in the direction of collection main elementary data about medfly biology, behavior, host preferable, seasonal occurrence etc. All this data are necessary for further observations which will be used for the preparing the study of the sterile insect program by using sterile males to control medfly in the selected area, the Neretva river valley, as the most important economic citrus and environment endangered area.

Numerous medfly host plants which grows in whole region of Dalmacija shows possibilities that medfly can easily reproduce from May when first possible hosts are having fruits like loquats – *Eryobotria japonica* and apricots – *Prunus armeniaca*. Later, more preferable hosts are available, such as peaches – *Prunus persicae*, nectarine – *P.p. var nectarine* and special important and area wide present numerous fig – *Ficus carica* and wild fig – *Ficus carica var caprificus*. The period starting

from September gives more preferable hosts such as Japanese apple – *Dyospiros kaki*, mandarins – *Citrus reticulata* etc.

Trapping data shows that the period of captures varies from earliest beginning of July until end of December.

Trapping data from the Neretva river valley are shown in figure 2. On this area first captures can start from half August like it was in 2002., or in the first decade of September like it was in 2003. The location in Metković shows the highest captures during both years of observations and maximum of 269 flies per trap were recorded in end of September / beginning of October. Much lower captures were recorded both at Opuzen and Modrič locations.

The results shown in figure 3 shows that during four years of observation, the highest capture were recorded at the Metković location, while much lower captures were recorded at Opuzen and Modrič locations.

The hottest area has been defined around city of Metković, which is located on the border with Bosnia and Herzegovina, with numerous cultivated and ornamental host plants, with accent on loquats – *E. japonica* at almost all city streets and all kind of cultivated stone fruit trees. It should be expressed that across the state border in Bosnia and Hercegovina there are hundreds of ha of peaches – *P. persica*, nectarines – *P.p. var nectarine* and plumbs – *P. domestica*.

At some very infested orchards almost 250 flies per trap were captured weekly. The lowest captures, less than 10 flies per trap weekly, were recorded at the lower part of the valley, where mostly mandarin orchards are placed. Small urban areas with higher number of host plants around shows higher captures.

Generally, two main areas can be defined. The lower part of the valley with mostly mandarin crop and low medfly capture and higher part of the valley with numerous host plants and very high capture datas. In total, the treatment area in SIT suppression program could be estimated to up to 25-30.000 ha of join Croatian and BiH sides.

The hypsometric map of the Croatian part of the river Neretva valley, shows great geographic isolation of whole area. It should be expressed that very limited vegetation of non-host plants has been recorded over 200-250 meter high. In lower parts, special in first 100-150 meter following medfly host plants was recorded: wild fig – *Ficus carica var. caprificus*, wild berry – *Prunus mahaleb* and wild briar (dog-rose berry) – *Punica spp.* Also some weeds such as *Solanum nigrum* were recorded. Higher areas of surrounding hills are almost only stone. However, hilly areas should be taken into calculation of SIT releasing treatment. The temperature data collected for Neretva and surrounding areas were collected from different sources, but still represent average monthly temperature as an minimum one decade data. Data were collected for Dalmatian locations Dubrovnik-Čibača, city of Ston, city of Split and city of Opuzen.

3. GENERAL STRATEGY

2007-2008 (colaboration with IAEA TC 2006001):

- * Feasibility study of Medfly Suppression by SIT in the Neretva Valley,
- * Preparation of an economic feasibility study including the following scenarios:
 - full production on site
 - shipping of eggs
 - shipping of sterile pupae
- * Regional grup trained for SIT operations 2009-2010:
- * Location for facility selected in the Neretva valley
- * Location and administrative documentation
- * Rearing/Eclasion facility build
- * Development of release system in aquatic areas

2011>

- * Start of the SIT suppression programme

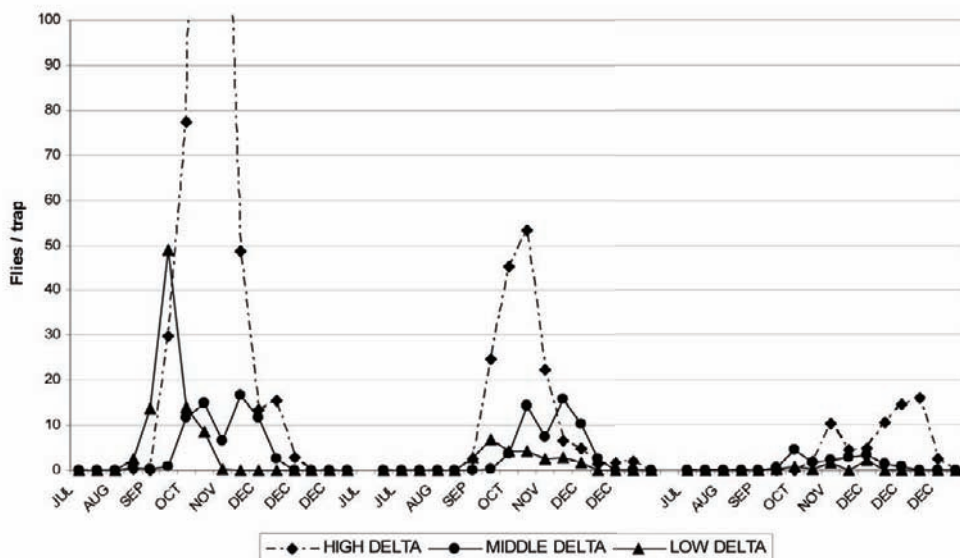


Figure 1: Population dynamic of *Ceratitits capitata* in the different parts of the delta Neretva valley, during period 2002 - 2004 Year

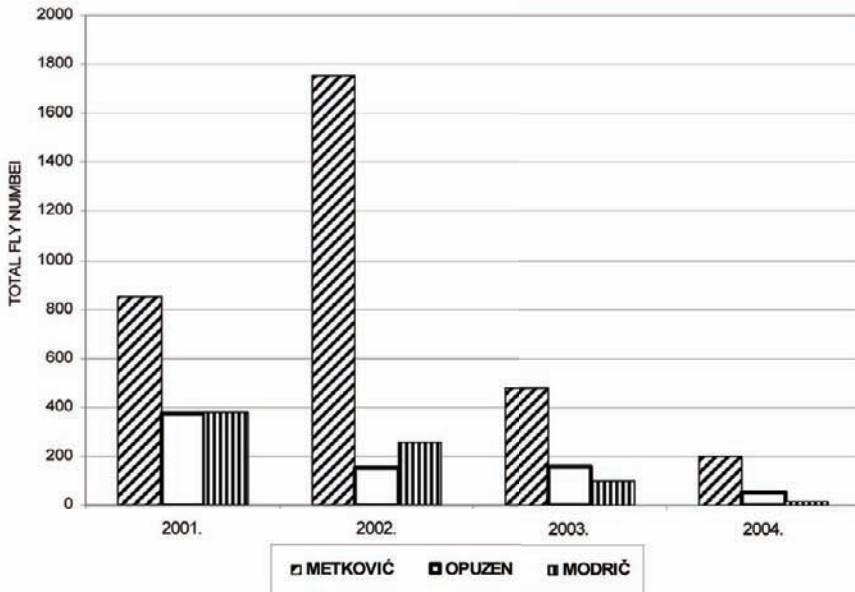


Figure 2: Medfly capture on selected locations with different host availability in neretva river valley during september and october

4. CONCLUSIONS

The results collected during the four years observation period shows that medfly can reproduce easily due to numerous host plants available along the Dalmacija region. Also, there are no data about period when first adults emerge after winter period. Results show that the earliest capture were recorded in early July, what can be explained by very low medfly population before July. The results show that medfly reproduce very quickly and yearly peak of population is very similar in all areas observed, defined during September and October. Also, no catches were recorded after first decade of December. It seems that medfly can create high population through the late spring and early summer, and heavily attack citrus fruits.

This speculation can be supported through the observation data collected in Neretva river valley. The lower part, planted mostly with mandarin monoculture was observed and low medfly population was recorded. Also

mandarin was not attacked heavily. In other side, the upper part of the valley with different consist of host plants give to medfly possibilities to create high population and create high damage on mandarins, witch represents small part of total crop in the area. The density of the medfly is the highest in the upper part, specially by the border with Bosnia and Herzegovina. This indicates to necessity of join action program of medfly suppression in this part of the valley.

The hypsometric data show possibility even to divide the valley to two separated sectors for treatment. It should be taken in considering that program of medfly control by SIT technique could be feasible if only lower part, from the coastal line up to the city of Opuzen can be treated. However, the best solution is to treat whole area as geographic isolated system. It should be apostrophe that environment pollution aspect except only friendly area wide methods such as SIT technique and other environmental friendly supportive techniques.

The feasibility study of medfly suppression by means of sterile males released program is undergoing. Some information data however need to be observed.

Implementing of the SIT technique will specially benefits the Croatian County of the Dubrovačko neretvanska županija and BiH County of Hercegovačko neretvanska županija, together with their farmers, stakeholders and local communities.

5. ACKNOWLEDGMENTS

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