METCALFA PRUINOSA (SAY): BIOLOGY AND HONEY DERIVED FROM THE HONEYDEW

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Introduction

Metcalfa pruinosa (Say) (Homoptera Rhyncota Auchenorrhyncha Flatidae), a planthopper indigenous to North and Central America accidentally introduced into Italy, was discovered for the first time at the end of the seventies near Treviso; afterwards thanks to its polyphagous feeding habits, the high mobility of adults and the absence of specific predators, it spread quickly through many Italian regions.

The confirmed host plants in Italy are both wild and cultivated. The infestation of farmland starts from insects on wild arboreous or shrub plants located on the borders of the fields.

The direct damage to the plants is limited, while the indirect damage is much more evident and economically important. The latter consist in the dirtying of the vegetation because of remarkable amounts of honeydew produced, which is a favourable substrate for fungi.
The honeydew of Metcalfa pruinosa represent a food for several insects and, in particular, is attractive for bees; the flow of honeydew produce by phytomize is discontinuous and is greater during the days following rain.

The importance of honeydew for bees is increased during the summer in the plains of Friuli-Venezia Giulia where there are not other melliferous sources, in the period at the end of the flowering time and the mowing of the hay. Thanks to this resource of sweetness the bees both obtain generous winter reserves and provide the beekeepers with a large amount of honey: during the nineties even over 40 kg/beehive were produced in 50 days of gathering.

Recently in northern Italy the insect populations of Metcalfa pruinosa have been reduced to a significant degree during the month of July just at the time when the adult individuals appear. As a result infestation has been limited and consequently also the amount of honeydew gathered by bees. Besides the scarce production of honey from honeydew a much more serious problem rose in the hives due the lack of glucide stores for the colony to winter on.

The fluctuation in the density of the metcalfa populations could be the result of many factors such as biological (e.g. entomophagous insects or other organisms), meteorological (e.g. very hot summers, intense rain), or anthropical (e.g. widespread use of plant protection products).

To gain further “biological” information on the dynamics of the metcalfa population, in the years 1998 and 1999 weekly observations were carried out in the Friuli-Venezia Giulia plain near Udine (north eastern Italy), on colonies infesting Robinia pseudoacacia trees. The depicted data are accumulated and come from three areas, located near the hive, typical of the studied zone and about 700 m between each other.

Graph:
Trends of metcalfa populations in the summers of 1998 and 1999. During the two years (1998 and 1999) the trend was very similar; the young forms (I, II, III, IV, V) represent, at the beginning of June, the totality of the populations; the adults (A), appeared half way through July, and represent the totality in the second ten days of August.

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Photographs:
Adults of *Metcalfa pruinosa* on *Salix caprea*.
Honeydew drops and colony of *Metcalfa pruinosa* on leaves of acer.
Suction of honeydew collected on the leaves using micropipettes.
Young forms and adults of *Metcalfa pruinosa* on *Zea mays*
The organoleptic and microscopic characteristics as well as the composition of this kind of honey have been studied since it first appeared on the market.

This honey can be easily identified by sensory analysis and distinguished from other honeydew honeys by its characteristic smell and taste.

The melissopalynological characteristics conform to the definition of honeydew honey, in particular the proportion between the elements indicative of honeydew and the pollen grains (IM/P) is greater than three and there is a prevalence of pollen grains of anemophilous species.

In the table showing the physical-chemical properties, the parameters considered characteristic are pointed out. The honeydew honey of metcalfa in fact has high values of colour, electric conductivity, pH and acidity, diastase, invertase and positive specific rotation. With regard to sugars it is pointed out that the contents of monosaccharides, fructose and glucose are low, and, in proportion, there are high values of oligosaccharides, among which, in addition to isomaltose indicated on the table, maltotriose, erlose, raffinose, trealose could be included too.

Some of these values are frequently beyond the limit established by law concerning honeydew honeys: such is the case of the acidity and sugar content. This has caused commercial problems: in particular the scarce presence of monosaccharides and the high content of polysaccharides threw doubt on the “authenticity” of this product. To clarify this aspect samples of honeydew produced by metcalfa were collected from different species of plants, and numerous samples of honeydew honey as well as nectar honey and fir tree honeydew honey were analysed by HPLC to evaluate the natural presence of dextrin. The latter was found in the honeydews, honey from metcalfa honeydew and to lesser extent in that from fir, but not in nectar honeys.
So it is shown that these compounds are already present on the honeydew.

Samples of honeydew produced on different plants have a different composition of dextrin: therefore it seems that some characteristics, such as physical state, often not uniform in honeydew honeys of metcalfa, are due to the different dextrin composition of the raw material.

Organoleptic characteristics

- Honeydew honey appears mainly liquid and viscous, coloured dark amber up to almost black.
- The olfactory and gustatory characteristics suggest the taste of dried fruit, treacle, tomato juice or fig jam.
- The poor sweetening power and the remarkable persistence of the taste in mouth are typical.

Photo:
Sediment of honeydew drops honey of *Metcalfa pruinosa* with fungal spores, green algae and anemophilous pollen grains.

Graphic:
Physical-chemical characteristics:
Humidity, HMF, Invertase, Prolin, Electric conductivity, Detaioled rotation, Colour, pH, Free acidity, Total acidity, Fructose, Glucose, Saccharose, Maltose, Isomaltose, Fructose+ Glucose.

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