

***Aedes albopictus* in
Italy (1990-2007) -
Updating on its
distribution and
seasonal behavioural
changes**

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Aedes albopictus in Italy

Route of entry and dispersal

Commercial port of Venice, 1991
A container of used tires
from Atlanta, Georgia, USA
was found positive for larvae
and eggs of the Tiger mosquito



3 ways of dispersal



Active
Natural (by flying)
1,5 Km in 2 years

Passive
by internal trade
of used tires

Passive Accidental
by cars and other
vehicules

Most of the new foci of *Ae. albopictus*
recorded in 1991- 93 originated from a local
scrap tire deposit

The two most important
tire retreading
companies that imported
scrap tires from USA
were located near
Padova and Bologna.

Batch of tires were
purchased by smallest
companies located in
other regions of Italy.

Activities carried out to contribute to the knowledge on the dynamics and spreading of *Aedes albopictus* in Italy (1/2)

- **1990.** *Aedes albopictus*'s presence was reported from Genoa, Liguria region;
- **1991.** The first record of *Ae. albopictus* establishment in Italy was in Veneto region, in a small town South of Padova. The infestation was found in a deposit of a tire retreating company : larvae were collected in used tires and in a wide variety of peridomestic containers;
- **1990. A programme for *Ae. albopictus* surveillance and control was established in Italy by the Ministry of Health, with the coordination of all activities by the ISS;**
- **1992.** It was assessed that a load of used tires coming from Atlanta, Georgia, found infested by *Ae. albopictus* eggs able to develop *in situ*, was one of the source of the infestation in Veneto Region. The “tiger mosquito” reached other Italian regions through gradual colonization of the bordering areas and through short or long distance passive transfer of egg and adult stages;
- **1993 -1994.** New infestations were recorded in other Regions (total 10 Regions)
- **1994.** An **International Workshop** “*The geographic spread of Aedes albopictus in Europe and the concern among public health authorities*” Rome, 19-20 December 1994, was organized by the ISS, in which guidelines for the control of *Ae. Albopictus* in Italy and eventually in Europe were developed;
- **1997.** In August 1997 a focus of *Ae. albopictus* was reported in two heavily populated suburbs of Rome
- **1998.** Scattered foci of *Ae. albopictus* were reported in 9 Regions and 107 municipalities, belonging to 22 provinces;
-

Activities carried out to contribute to the knowledge on the dynamics and spreading of *Aedes albopictus* in Italy (2/2)

- **2000-2006** – Studies on geographical distribution of *Ae. albopictus*, adults behaviour, and factors involved in the production of diapausing eggs:
 - Adults of the species were reported to be active from April (February-March in Rome) to October (November-December in Rome), peaking in August-September;
 - Female *Ae. albopictus* produced different numbers of summer eggs. The peak of egg hatching occurred at the 35^o week of the year (end of August). Starting from the 36^o week, when the photoperiod dropped below 14:10 h light:dark, a rapid decrease in summer egg production was recorded; the minimum value (17%) was reached during the first week of October. A new rise in egg hatching was recorded in October-November, probably because of a polymorphism in the diapause response of the population. Eggs completely ceased to hatch in mid-December. The photoperiodic eggs' hatching occurred between the end of April and the end of May, when the climatic conditions became more favourable: heavy raining, minimum temperature not lower than 10°C and 13.5 hr photoperiod. Adult females are exophilic, but also endophilic, and very antropophilic.
- Measures to control the mosquito population and individual protection against bites have been planned and widely recommended:
 - Source reduction of breeding habitats in residential areas;
 - Larvicidal control measures using either chemical or biological control;
 - Where there are heavy adult populations, space spraying of pyrethroids should be applied;



Is it possible to eradicate a focus of *Aedes albopictus*?

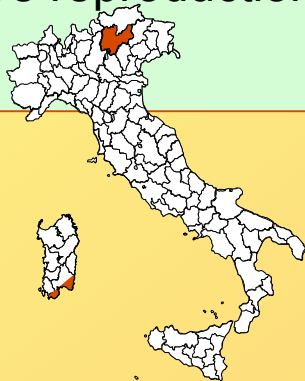
YES

if several conditions occur at the same time

Early active detection

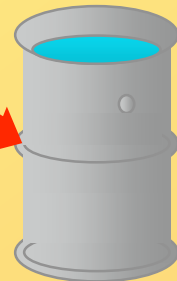
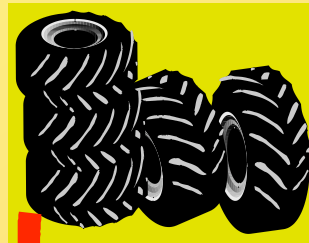
Control intervention carried out by a qualified structure

Climatic conditions of the site are unfavourable to a massive reproduction

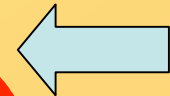


NO

If detected by passive reporting
When the biting activity of females become evident
the mosquito population is already strongly established

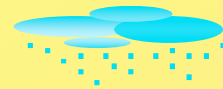
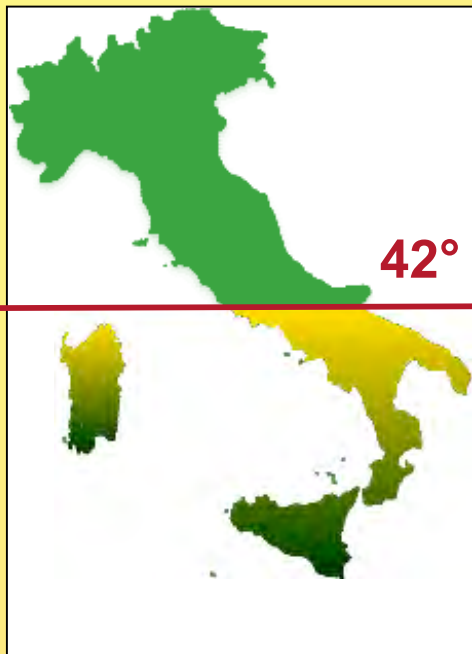


Too late



Seasonal dynamics of italian populations of *Aedes albopictus*

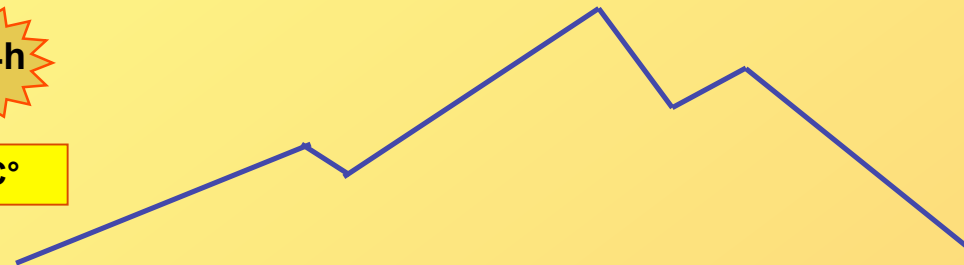
Italy is a long and narrow country



13-14h

T > 10C°

Main peak of density between late August and September



12 h

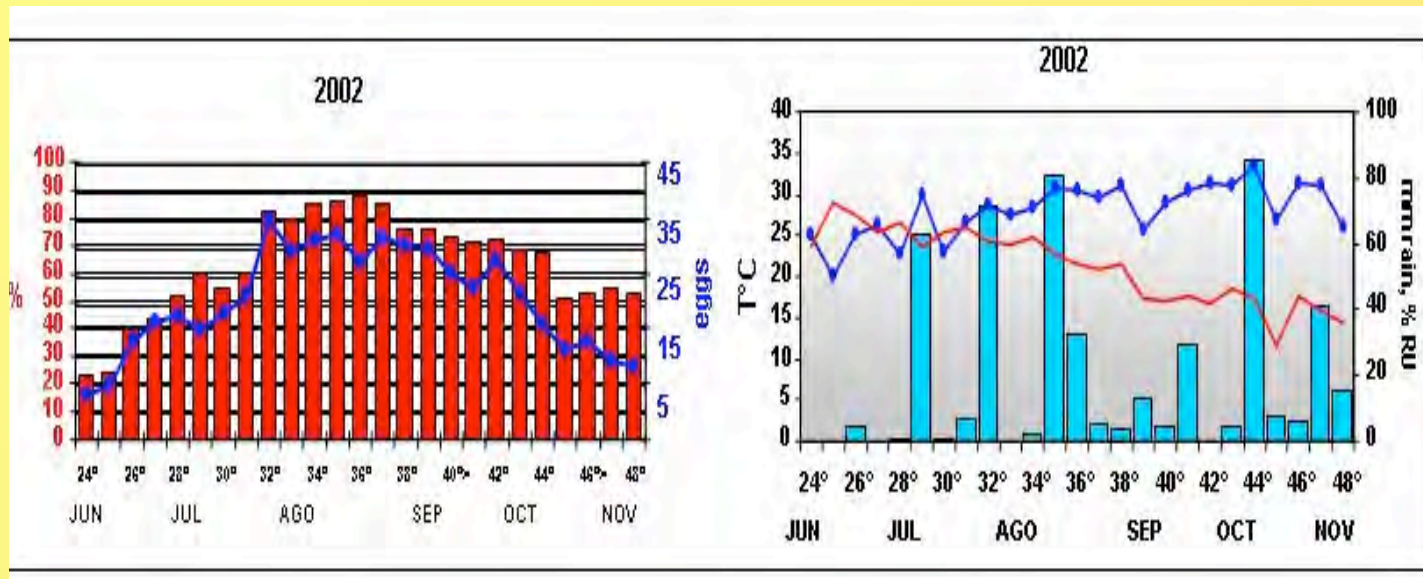
T < 10 C°

First record between late February and-May

Last record between October and December

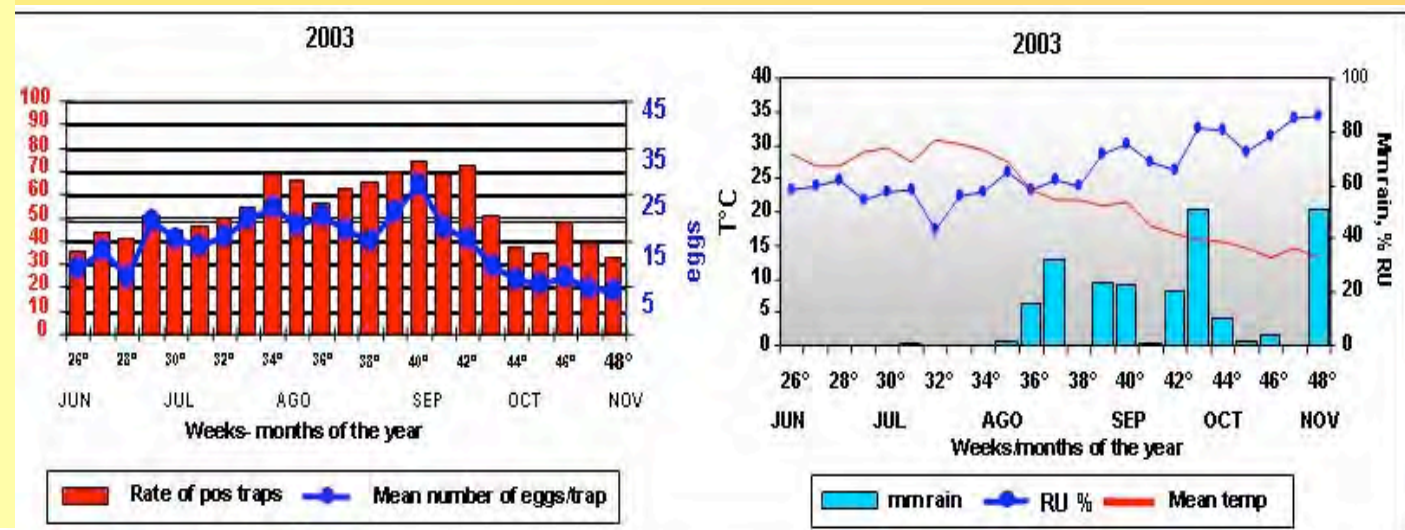
Italy extend from 38° to 46° latitude. Marked differences in climate occur in the 20 regions of the country. In general terms, south of the 42° latitude N massive reproduction of the species is limited by the scarcity of rain during the summer

The importance of rainfall during summertime



2002
 About **600** mm rain between June-August
 Rate of positive traps peaking around **90%**, with a mean of **30-35** egg/trap

2003
 About **300** mm rain between June-August
 Rate of positive traps peaking around **70%**, with a mean of **20-25** egg/trap



The high density of some *Ae. albopictus* populations may enhance abnormal behaviors

EXPECTED

Daylight biting

Outdoor biting

Exophilic

Overwintering by eggs

Winter egg laying induced by the short photoperiod (< 14h light/day and by low temperatures (mean daily T < 10°C)

OBSERVED

Trophic activity also during the night

Very common Indoor biting

Indoor adult resting and

larval breeding sites

Active biting females also

during the winter

Tiger mosquito populations established in Italy are not genetically homogeneous showing a marked polymorphism for the characters involved in winter survival

Strategies of survival.

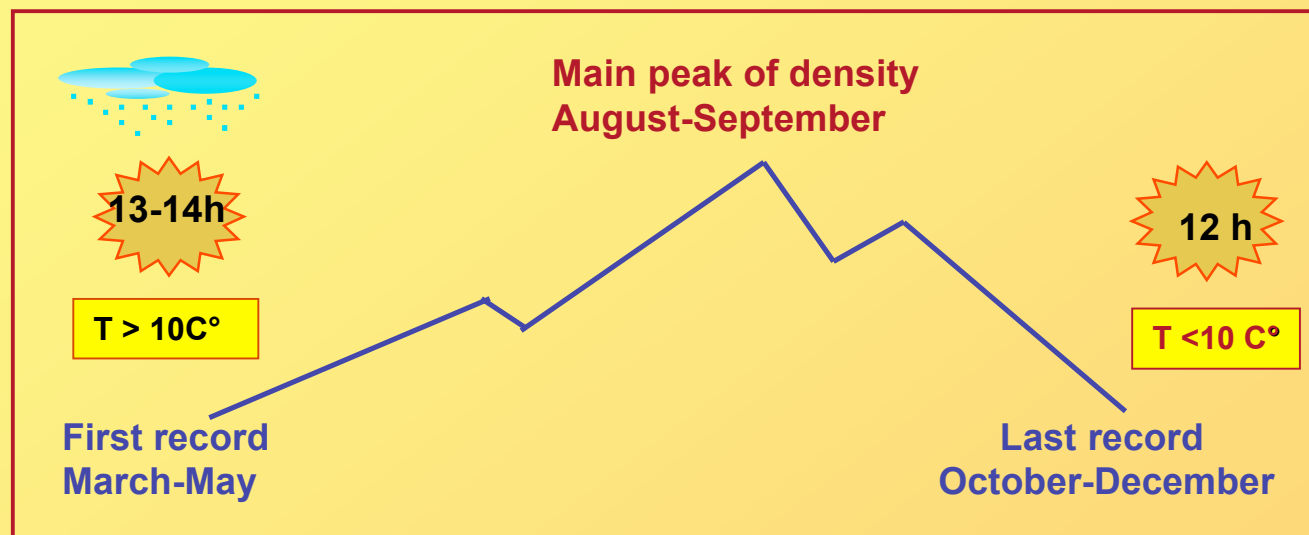
Females did not lay eggs all together in a single site but few eggs in different sites
A certain amount of eggs that not hatch is produced also during the summer

It should be stressed that during the summer with mean temperatures over 25°C, the biological cycle from egg hatching to adult may be completed in 6-7 days

Seasonal dynamics of italian populations of *Aedes albopictus*



Italy extend from 38° to 46° latitude. Marked differences in climate occur in the 20 regions of the country. In general terms, south of the 40° massive reproduction of the species is limited by the scarcity of rain



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SEASONAL PATTERNS OF OVIPOSITION AND EGG HATCHING RATE OF *Aedes albopictus* IN ROME

LUCIANO TOMA,¹ FRANCESCO SEVERINI,¹ MARCO DI LUCA,¹ ANTONINO BELLA² AND ROBERTO ROMI¹

ABSTRACT. Since its introduction in Italy in 1990, *Aedes albopictus* has spread quickly across the northern

A certain amount of eggs that not hatch at the first wet and dry shock is produced also during the summer as a strategy of survival. This amount exceed 50% about one month after the main peak of density

Spread of the "Tiger mosquito" in Rome 1997-2000

1997

Late summer:

First passive record of foci of the mosquito in the opposite sides of the urban area. The species is already strongly established

1998-99

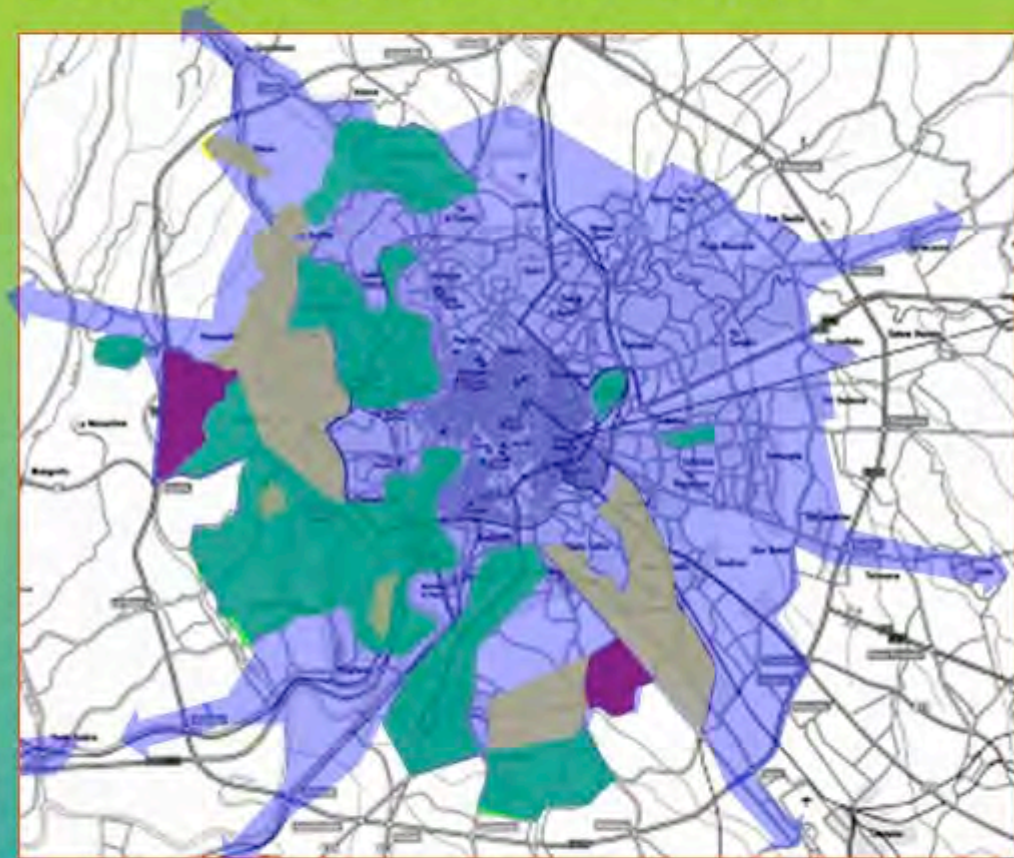
Despite the attempt of control its spread, the "Tiger" colonized 2/3 of the urban area

2000

The invasion is completed.

In this phase of maximum expansion, Our monitoring net recorded positive ovitraps with peaks of more than 600 eggs. At present, years after the establishment of the mosquito colony, the number of egg/trap never exceed 100.

350 Km² surface, 4 millions inhabitants



A great ability to adapt to different climatic conditions

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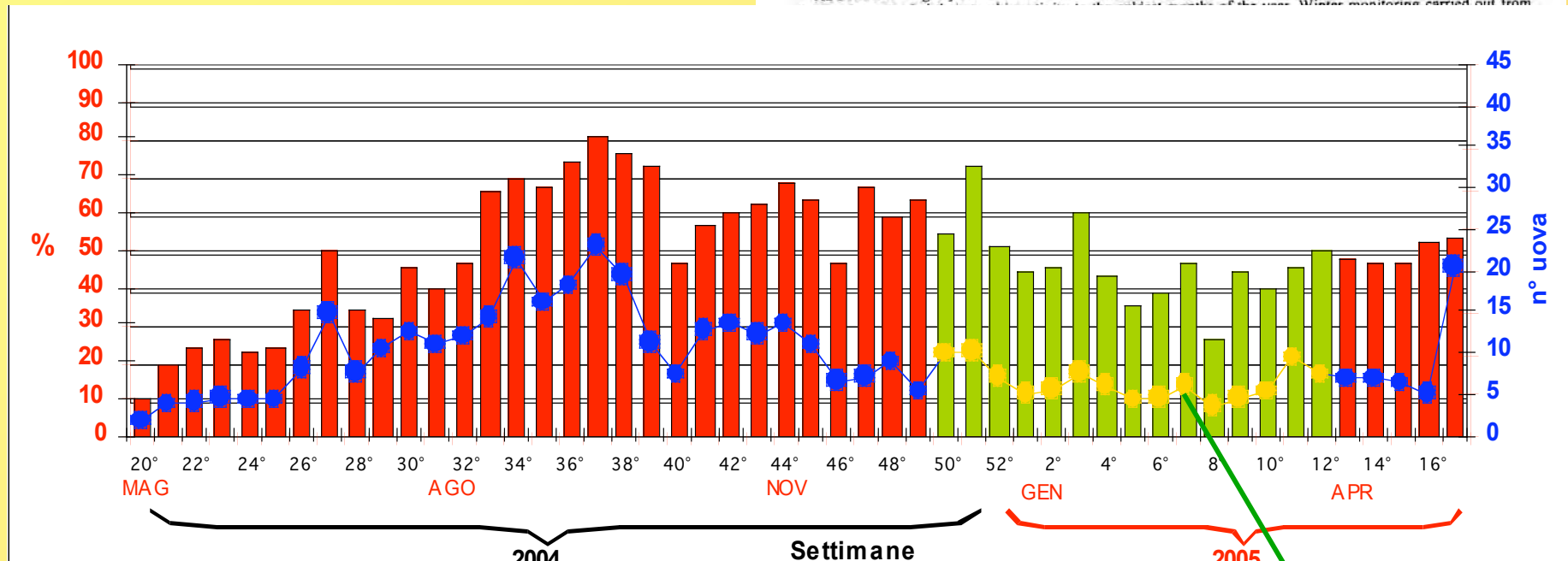
SCIENTIFIC NOTE

COLD ACCLIMATION AND OVERWINTERING OF FEMALE *Aedes albopictus* IN ROMA

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Department of Infectious, Parasitic and Immunomediated Diseases, Istituto Superiore di Sanità, Roma, Italy

ABSTRACT. Eight years after the introduction and establishment of *Aedes albopictus* in Roma, females of



Our monitoring net in Roma is based on 650 ovitraps covering the whole urban area. Data are collected and analyzed weekly

Two parameters are considered for analysis

Rate of positive traps out of traps operating (red and green bars)

Mean number of eggs by positive trap (blue and yellow lines)

Eggs do not hatch up to March

“Tiger mosquito” in Rome

Conclusions. As previously reported, the presence of *Ae. albopictus* in Rome is firmly stable. The mild climate of the city has probably contributed to deselect the characters that provide the ability of overwintering. In alternative, the climate may have simply favoured the development of these population's fractions polymorphic for the characters that allows to survive in.

For the first time some eggs, laid down during the winter hatched from December to February: larvae did not survive the low temperatures (greenhouse), while they were able to survive and reach adult stage in indoor sites (lab conditions). Further studies have been planned for the coming years.

Insecticides (Biocides EU directive) available for chemical control of arthropods of medical importance

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SUSCEPTIBILITY OF ITALIAN POPULATIONS OF *Aedes albopictus* TO TEMEPHOS AND TO OTHER INSECTICIDES

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Istituto Superiore Di Sanità, Laboratorio di Parassitologia, Roma, Italy

ABSTRACT. We evaluated larval and adult susceptibility to 5 insecticides commonly used for control of *A. albopictus*, by using 15 field-collected populations from northern and central Italy, and we compared

Active ingredients available in Italy as larvicides

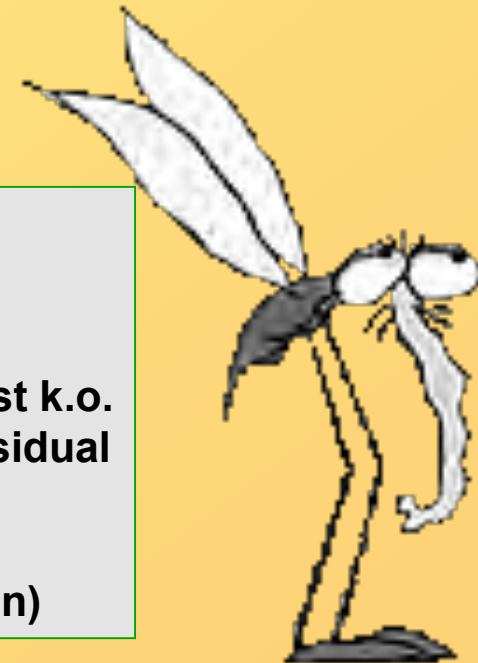
Diflubenzuron (IGR)
Piryproxifen (IGR)
Bacillus thuringiensis israelensis
Fenthion (OP)

No longer available

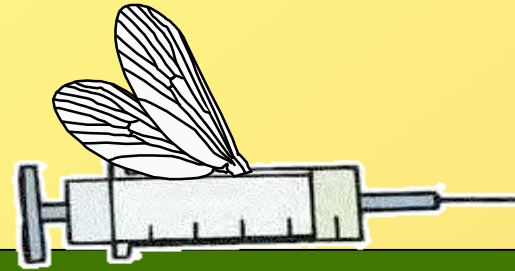
Active ingredients available in Italy as adulticides Pyrethrins and pyrethroids

Usually a mixture of First generation a.i. (i.e. tetramethrin, fast k.o. activity) and second –thrid genration a.i. (i.e. permethrin, residual activity) plus a synergist (piperonil butoxide)

Avoid to use deltamethrin or lambdacyalothrin (irritant action)



Aedes albopictus as a flying siringe




Aedes albopictus as arbovirus vector

Experimental infection with 23 arboviruses



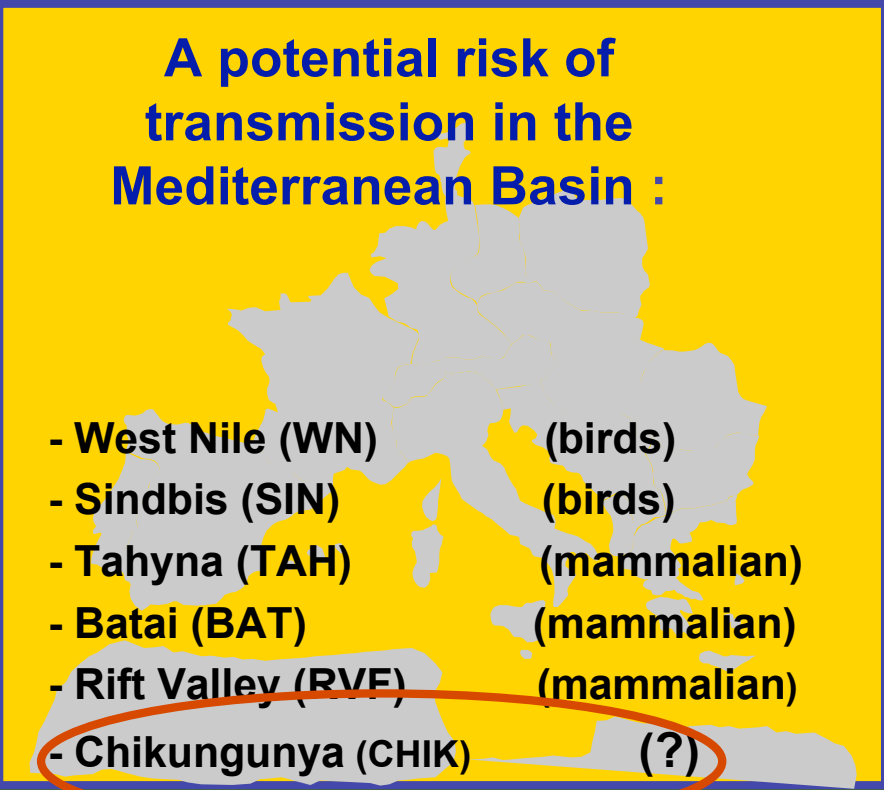
Isolati in Asia
YF
DEN (1-4)
JE

Isolati in USA



Potosi
Keystone
Tensaw
C. Valley
Lacrosse

A potential risk of transmission in the Mediterranean Basin :

- 
- West Nile (WN) (birds)
 - Sindbis (SIN) (birds)
 - Tahyna (TAH) (mammalian)
 - Batai (BAT) (mammalian)
 - Rift Valley (RVF) (mammalian)
 - Chikungunya (CHIK) (?)

Outbreak of Chikungunya virus in Italy: why Castiglione ???



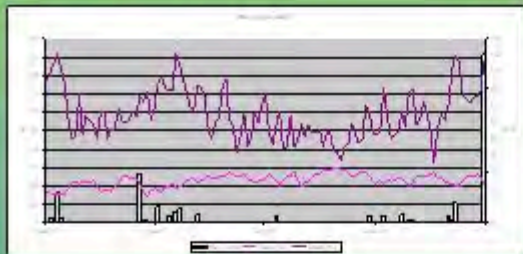
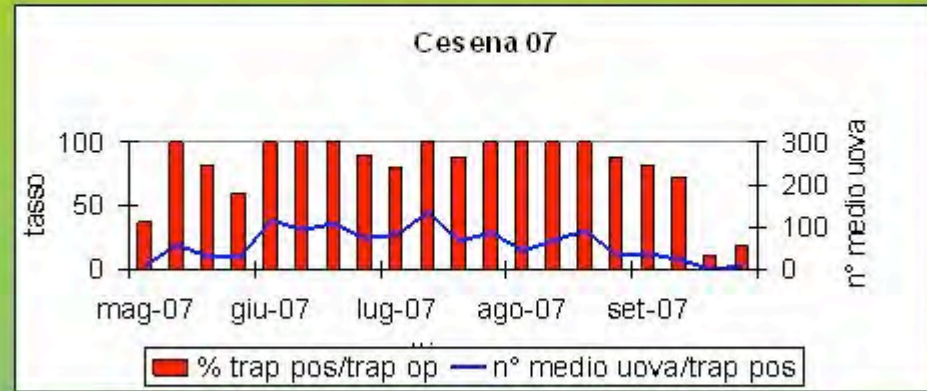
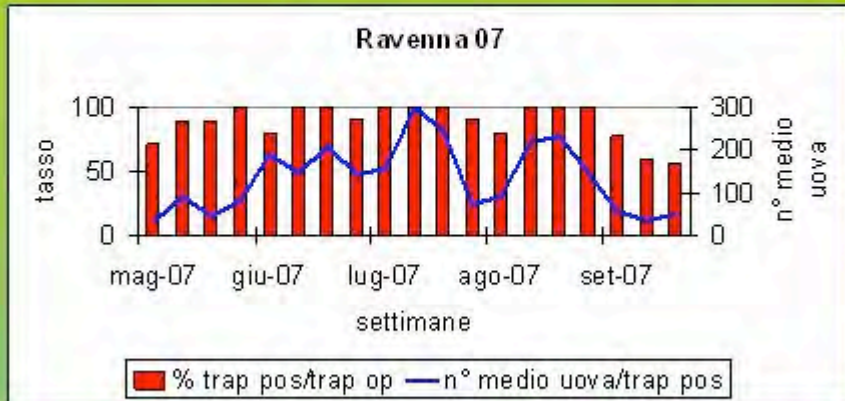
- Outbreak area in 2007
- Other monitored areas



Data on monitoring have been collected within the regional program of surveillance (Assessorato alle politiche per la salute della Regione Emilia Romagna) www.zanzaratigreonline.it and made available by the courtesy of Dr Paola Angelini (regione) and Dr Claudio Venturelli (ASL Cesena)



Supposed abundance of *Aedes albopictus* related to climatic conditions in the main focus where of CHIK outbreak occurred



METEO DATA
(relative to july-sept.)
Mean Temp 25-30 °C
RU 40-70 %
Rainfall 15-20 mm

