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Kermes vermilio Planchon and *Nidularia pulvinata* (Planchon, 1864) (Hemiptera Kermesidae) outbreaks off urban *Quercus ilex* L. (Fagaceae)

ABSTRACT

Kermes vermilio and *Nidularia pulvinata* severe outbreaks are lethal to young holly oaks and strongly damage adult trees. Such infestations are common in several South Italian urban and peri-urban areas and have been reported for a while. Recently we have been observing in Bari (Apulia region) a new considerable invasion of both *Nidularia* and *Kermes* on *Q. ilex* not scale-infested hitherto. The phenomenon is possibly in connection with the new northward expansion of *Nidularia* that is presently recorded in Italian areas with a continental climate as Veneto and Romagna regions. City surveys and damage estimations revealed the entity of kermesidae impact regarding direct and indirect costs for the maintenance of urban parks, public gardens and leisure areas, avenues and boulevards. Moreover, we discuss the synecology of the two species evaluating the prevalence of mixed infestations on the same plant or the reciprocal competitive displacement. Possible causes of the actual outbreak may lie in ecological disturbance along the rural-urban transition zone, changes in the available range of insecticides, wrong or absent tree maintenance, changes or fluctuation in climatic parameters.

Mixed infestations by *Kermes vermilio* and *Nidularia pulvinata* off *Quercus ilex* are not truly mixed; this is evident as we realise that K. vermilio prefers to infest host twigs while N. pulvinata mostly sets on the trunk and the main branches. The two species seems to share a single host plant occupying two near but distinct niches.

Damages are similar, being both the Kermesidae capable of inducing die back, but *Nidularia* actively damages the trunk, also.

In a case of infested public greeneries, the officers are usually unable to check the pests, i. e. by an IPM strategy or by chemical control. Possibly because of the extended swarming of crawlers or the missing of effective insecticide authorised for urban area use. Moderate control is given by tree formulate injection but results often less useful than expected. Another phytosanitary "pest cleaning" measure applied by the officers consists of cutting down symptomatic dried twigs as massive pruning every four-five years.

Intense pruning in spring and the consequent plant re-sprouting appears favourable to plant health but for a very short lapse. New sprouts are quickly colonised by wandering crawlers and became intensely infested. Moreover, twigs and small branches cut down leave on the plant much more of the *Nidularia* population while prune down most of the *Kermes* out the plant.

Intense and not timed pruning favours *Nidularia* by displacing *Kermes* from the host plant in such a way that urban *Q. ilex* are heavily infested by the most damaging and lethal of the two pest species.

We classified from 1 to 5 the staging of the die back induced by Kermesidae, as reported in table below.

Roberto R., Diana L., Russo V., Porcelli F., Pellizzari G. (2016); *Kermes vermilio* Planchon and *Nidularia pulvinata* (Planchon, 1864) (Hemiptera Kermesidae) outbreaks off urban *Quercus ilex* L. (Fagaceae),*Poster presented at the XIV International Symposium on Scale Insect Studies - ISSIS June, 13th - 16th, 2016 - Catania - Italy; Entomologica*, Bari, 47: 21-23; doi: dx. doi. org/10. 15162/0425-1016/447
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Part of this study was presented during the ISSIS XIV 13-16 June 2016, Catania - Italy

Staging and estimating the die back induced by Kermesidae

Stage	symptoms
1	infested but symptomless
2	scarce die back: 5-10% of twigs
3	moderate die back: 11-50% of twigs
4	serious die back: 50-89% of twigs
5	lethal die back: >90% of twigs

Finally, we consider the differences between two study areas, both in Bari, Italy: the small market square between via G. Salvemini and F. Sorrentino and the area of L. De Laurentis avenue. We scrutinised the trees to estimate the infestation, to stage the symptoms and evaluate the damage. We reported the results of the two study areas as a comparison between a new (Market Square) and an old (De Laurentis avenue) infestations in the table and the pie chart below.

Infestation estimation in two different urban areas

Market square		
Stage	n° of oaks	%
1	4	8, 89
2	3	6, 67
3	8	17, 78
4	30	66, 67
Total	45	100, 01
De Laurentis avenue		
Stage	n° of oaks	%
1	43	30, 50
2	33	23, 40
3	37	26, 24
4	23	16, 31
5	5	3, 55
Total	141	100, 00

ACKNOWLEDGEMENT

We recognize the support of Applied Ecology during this study.

Kermes vermilio Planchon and *Nidularia pulvinata* (Planchon, 1864) (Hemiptera Kermesidae) outbreaks off urban *Quercus ilex* L. (Fagaceae)

R. Roberto[1-3], L. Diana[1], V. Russo[4], F. Porcelli[1-3-4-5], G. Pellizzari[2]

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ABSTRACT. *Kermes vermilio* and *Nidularia pulvinata* intense outbreaks are lethal to young holly oaks and strongly damage adult trees. Such infestations are common in several South Italian urban and peri-urban areas and have been reported for a while. Recently we have been observing in Bari (Apulia region) an ever considerable invasion of both Nidularia and Kermes on *Q. ilex* not scale-infested hitherto. The phenomenon is possibly in connection with the new northward expansion of Nidularia that is presently recorded in Italian areas with a continental climate as Veneto and Romagna regions. City surveys and damage estimations revealed the entity of kermesidae impact regarding direct and indirect costs for the maintenance of urban parks, public gardens and leisure areas, avenues and boulevards. Moreover, we discuss the synecology of the two species evaluating the prevalence of mixed infestations on the same plant or the reciprocal competitive displacement. Possible causes of the actual outbreak may lie in ecological disturbance along the rural-urban transition zone, changes in the available range of insecticides, wrong or absent tree maintenance, changes or fluctuation in climatic parameters.

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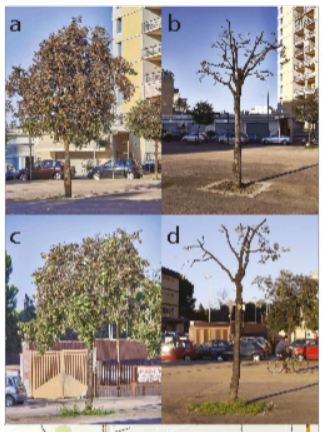

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Intense and not timed pruning favours *Nidularia* by displacing *Kermes* from the host plant in such a way that urban *Q. ilex* are heavily infested by the most damaging and lethal of the two pest species.

Finally, we consider the differences (see table) between the two study areas as the results of a new (Market Square) versus an old (De Laurentis avenue) infestations.

Left pictures show the massive *Quercus ilex* pruning given every four/five years. Pruning is severed (c d) in conjunction with die back (a c) because they considers phytosanitary "pest cleaning" measure to cut down symptomatic dried twigs.

Staging and estimating the die back induced by Kermesidae

Stage	symptoms
1	infested but symptomless
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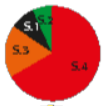
Infestation estimation in two different urban areas:

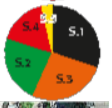
Market square

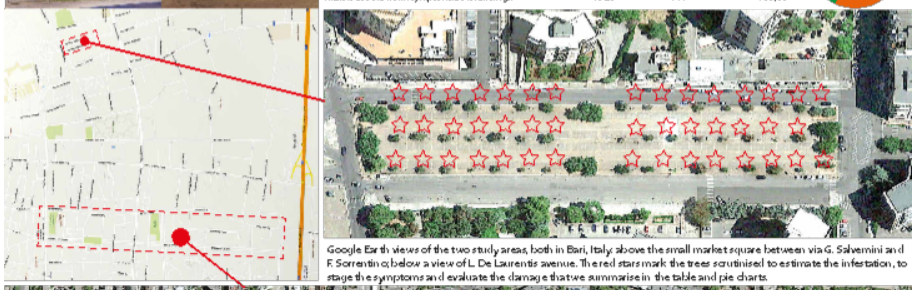
Stage	n° of oaks	%
1	4	8,89
2	3	6,67
3	8	17,78
4	30	66,67
Total	45	100,01



De Laurentis avenue

Stage	n° of oaks	%
1	43	30,50
2	33	23,40
3	37	26,24
4	23	16,31
5	5	3,55
Total	141	100,00





Google Earth views of the two study areas, both in Bari, Italy; above the small market square between via G. Salvemini and F. Sorrentino; below a view of L. De Laurentis avenue. The red stars mark the trees scrutinised to estimate the infestation, to stage the symptoms and evaluate the damage that we summarise in the table and pie charts.

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