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Geography has impact on grapevine moth's success in French vineyards

mercredi 8 janvier 2014 12:32 Springer Science+Business Media

Study sheds light on how regional differences, local temperatures influence immune function of pests

'Location, location, location' is an adage also true for the European grapevine moth, it seems. Research led by Fanny Vogelweith of the Université de Bourgogne and INRA Bordeaux-Aquitaine in France has shown that these pests are better adapted and more successful in certain French wine-growing regions than in others, because of the variety of grape on which they occur and the abundance of their natural enemies around them. The findings were published in Springer's journal *Naturwissenschaften - The Science of Nature*.

The European grapevine moth (*Lobesia botrana*) is a major grape pest in Europe because of its wide geographical distribution. The damage caused when its larvae feed on grape berries makes infection by pathogenic fungi, including the grey and black mold, easier. This leads to losses suffered by farmers.

To further understand the moth, Vogelweith's team assessed how the immune variation of its wild populations is influenced by its host plants and natural enemies. This is an important factor, as the maintenance of the immune system is generally a costly affair for most organisms and can inhibit growth and spread.

The research team therefore collected and measured larvae from up to five grape varieties from vineyards in six French viticulture regions, namely Alsace, Aquitaine, Bourgogne, Champagne-Ardenne, Rhône-Alpes, and Provence-Alpes-Côte d'Azur. Parasites found on these larvae were also collected and analyzed.

The researchers found a marked geographical variation in the immune defense and the level of parasitism among natural populations of the grapevine moth. The more parasites found in a vineyard, the higher the investment in immune defense rather than body growth. This suggests that immune defense is metabolically expensive.

Larvae sampled in the southern area from the Chardonnay, Pinot Gris, and Pinot Noir varieties tended to have a greater number of immune-related hemocyte cells and a higher level of antimicrobial activity than larvae sampled from these varieties in the northern area. These geographical variations within the same grape variety could be ascribed to the mean local temperature differences along a north-south gradient experienced from Champagne-Ardenne and Alsace in the north to Aquitaine and Provence-Alpes-Côte d'Azur in the south.

"The findings emphasize the roles of host plants and parasitoids as selective forces that shape host immune functions under natural conditions," says Vogelweith. "Studies such as these are central to understanding natural variations in immune functions, and the selective forces beyond." She added that further research is necessary to clarify the influence of grape variety on the immune system.

Informations bibliographiques complètes:

Reference: Vogelweith, F. et al (2013). Geographical variation in parasitism shapes larval immune function in a phytophagous insect, *Naturwissenschaften - The Science of Nature* DOI 10.1007/s00114-013-1119-1