




Quick scan for *Melanagromyza obtusa*

National Plant Protection Organization, the Netherlands

Quick scan number: 2023ENT001

Quick scan date: 17/03/2023

No.	Question	Quick scan answer for <i>Melanagromyza obtusa</i>
1.	What is the scientific name (if possible up to species level + author, also include (sub)family and order) and English/common name of the organism? <i>Add picture of organism/damage if available and publication allowed.</i>	<p><i>Melanagromyza obtusa</i> (Malloch, 1914) (Diptera: Agromyzidae), the pigeon pea pod fly.</p>  <p>Figure 1: Larval feeding damage on pigeon-pea, arrow points at the gallery made by the larva inside the seed. Photo by NVWA.</p>
2.	What prompted this quick scan?	In March 2023, the Dutch NPPO received a sample of pigeon pea (<i>Cajanus cajan</i>) with puparia in the pods and larvae in the seeds.

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	<i>Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.</i>	
3.	What is the risk assessment area?	The risk assessment area is the territory of the European Union (EU 27)
4.	What is the current area of distribution?	<i>Melanagromyza obtusa</i> is native to tropical Asia where it occurs widely, being present in India, Sri Lanka, Bangladesh, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam, Taiwan, Japan, Indonesia, Malaya and New Guinea. Since about 2000 the fly is present in Puerto Rico and in 2003 it was found in Florida, USA (Steck, 2003). In 2016 it was reported from Colombia (Martínez-Alava et al., 2016).
5.	What are the host plants?	<p>All known hosts are Fabaceae.</p> <p><i>M. obtusa</i> is especially known attacking <i>Cajanus cajan</i> (pigeon pea). Several other species within the genera <i>Cajanus</i>, <i>Flemingia</i>, and <i>Rhynchosia</i> are also known as hosts (Shanower et al., 1998).</p> <p>In India, <i>F. macrophylla</i> and <i>Rhynchosia minima</i> are important off-season alternative host plants when <i>Cajanus cajan</i> is not available (Khokhar & Singh, 1987; Shanower et al., 1998; Sithanatham & Sehgal, 1985).</p> <p><i>Cajanus</i>, <i>Flemingia</i> and <i>Rhynchosia</i> belong to the same Fabaceae subtribe, <i>Cajaninae</i> (Spencer, 1990).</p> <p>Besides <i>Cajanus</i>, <i>Flemingia</i> and <i>Rhynchosia</i> spp., Shanower et al. (1998) also list <i>Dunbaria</i> spp. and <i>Tephrosia purpurea</i> as host plants. However, information is very limited and their host plant status may need confirmation.</p> <p><i>Vigna</i> spp. (<i>V. radiata</i> and <i>V. unguiculata</i>) have also been reported as host plants (Shanower et al., 1998; Spencer, 1973). Their host status, however, needs confirmation according to Shanower et al. (1998).</p> <p><i>M. obtusa</i> was successfully reared on <i>Glycine max</i>, <i>Lablab purpureus</i>, <i>Phaseolus aureus</i> (new name: <i>Vigna radiata</i>) and <i>Vigna unguiculata</i> (Mazumdar & Bhuiya, 2014). This is, however, no proof that the plant species are suitable for development of <i>M. obtusa</i> under natural conditions. Pandey (1962) reports infestation of soybean (<i>Glycine max</i>) but no other records of natural infestation were found for soybean. Shanower et al. (1998) does not list soybean as a host plant and soybean is considered an uncertain host plant.</p>
6.	Does the organism cause any kind of plant damage in the current area of distribution and/or does the consignment demonstrate damage suspected to have been caused by this organism?	Yes. In northern Vietnam, <i>M. obtusa</i> is considered the most destructive pest of pigeon pea. Hong et al. (1992) reported seed damage levels ranging between 88-99%. In Uttar Pradesh, India, seed damage levels between 14-46% have been observed in farmers' fields (Shanower et al. (1998) and ref therein). An infestation by <i>M. obtusa</i> may go

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	<p>Yes/no + plant species on which damage has been reported + short description of symptoms. Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).</p>	<p>without external symptoms on the pods. Adults lay eggs directly inside developing pods. Larvae feed on – and mine into – the developing seeds, the resulting damage is visible when opening the pod and inspecting the seeds for symptoms (see Figure 1). Third instar larvae exit the seed and will chew a small circular window into the seed pod, leaving a thin layer of the epidermis intact.</p> <p><i>Flemingia macrophylla</i> (used for lac production) can be heavily attacked (Shanower et al., 1998). Kulkarni (1966) found pod infestation levels of 4-75%; damaged seeds had on average a 63.5% lower weight than healthy seeds.</p> <p>In India, 19% of pods of <i>Rhyncosia minima</i> were found infested between April and November (Khokhar, 1987 in Shanower et al., 1998). <i>R. minima</i> is not grown as a commercial crop but is considered an important alternative crop when pods of pigeon pea are absent.</p> <p>No information was found on infestation levels on <i>Dunbaria</i> spp. and <i>Tephrosia purpurea</i> (species listed as hosts by Shanower et al. (1998)).</p>
7.	<p>Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment).</p> <p>a. In greenhouses b. Outdoors c. Otherwise (e.g. storage facilities, human environment)</p>	<p><i>Melanagromyza obtusa</i> is native to tropical Asia and therefore outdoors establishment in the Netherlands is unlikely. Summer months may allow for transient populations.</p> <p>Establishment in greenhouses may be possible if suitable hosts are continuously available. <i>Vigna</i> spp. might be grown in greenhouses on a small acreage. It is, however, uncertain whether <i>M. obtusa</i> can survive a host free period between two crops.</p>
8.	<p>Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).</p>	<p>The climate in certain regions of Southern Europe may be suitable. For example, Uttar Pradesh has a predominantly hot-summer Mediterranean climate (Csa) where winter temperatures are cool and can occasionally drop below 0°C.</p> <p><i>Cajanus</i>, <i>Flemingia</i> and <i>Rhyncosia</i> (see Question 5) are absent or may have a limited distribution in the EU. <i>M. obtusa</i> may infest other Fabaceae (e.g. <i>Vigna</i> spp. that are present in the EU) but it is uncertain how well it develops on these plant species (see Question 5). In addition, host plants should be present year round which may further limit establishment. In conclusion: conditions (climate and availability of host plants) do not appear favourable for establishment of <i>M. obtusa</i> in the EU.</p>
9.	<p>What are the possible pathways that can contribute to spread of the organism after introduction? How rapid is the organism expected to spread (by natural dispersal and human activity)?</p>	<p>There is no information on active dispersal of <i>Melanagromyza</i> adults but studies on other Agromyzidae indicate that flies usually remain close to the host plant (Fenoglio et al., 2018). As with many small flying insects, wind is an important factor in dispersal.</p> <p>The main means of spread over larger distances is probably movement of infested pods by human activities.</p>

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10.	Provide an assessment of the type and amount of direct and indirect damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established in NL and the EU, respectively?	<p>The Netherlands (NL). In the Netherlands, significant damage by <i>M. obtusa</i> is unlikely to occur because of unfavourable climatic conditions (see Question 7). The species may be able to persist year round in greenhouses but host plants known to be seriously affected are not grown (see Question 7)</p> <p>European Union (EU) <i>Melanagromyza obtusa</i> is mainly known as an economic pest of pigeon pea (<i>C. cajan</i>). No information on production of pigeon peas in the EU had been found nor of <i>F. macrophylla</i>, which can also be heavily attacked. CBI (2023) mentions import of pigeon peas but does not mention any production in the EU. Mung bean (<i>V. radiata</i>) has been reported as a host plant. However, no information has been found on economic damage in this crop nor has any information been found on the production of Mung bean in the EU. Soybean is grown in the EU. However, only one record (from 1962) of infestation of soybean was found and there have been no reports of economic damage (see also Question 5)</p> <p>Thus, <i>M. obtusa</i> may not cause significant economic impact in the EU because of lack of host crops known to be seriously affected. Uncertainty: <i>M. obtusa</i> might infest and cause economic impact in other Fabaceae species that are grown commercially in the EU.</p> <p>No European-native Fabaceae species are known as host plants and no significant impact on biodiversity is expected if <i>M. obtusa</i> were to become established in the EU.</p>
11.	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? <i>If "no", go to question 12</i>	Yes, larvae and puparia were detected inside the pods.
12.	If the organism has been found on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables), what is the probability of introduction (entry + establishment)? <i>Only to be answered in case of an interception or a find.</i>	The pods that were intercepted contained puparia and 5-10 adults developed from these puparia within approximately a week under laboratory conditions at the NPPPO. If such pods are moved into an area suitable for establishment, introduction is assessed to be possible.
13.	Additional remarks	Infestations in pods may be difficult to detect. The inspector who intercepted the consignment was presumably triggered by damage to the pods caused by non-pest caterpillars. Upon opening the pods, the puparia and damaged seeds were discovered.
14.	References	CBI (2023). The European market potential for pigeon peas. Centre for the Promotion of Imports from developing countries. Retrieved 16-03-2023 from https://www.cbi.eu/market-information/grains-pulses-oilseeds/pigeon-peas/market-potential#which-european-countries-offer-the-most-opportunities-for-pigeon-peas

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		<p>Fenoglio, M. S., Videla, M., Salvo, S. A., & Morales, J. M. (2018). Dispersal of the pea leaf miner <i>Liriomyza huidobrensis</i> (Blanchard, 1926)(Diptera: Agromyzidae): a field experiment.</p> <p>Khokhar, K., & Singh, Z. (1987). Carry-over of <i>Melanagromyza obtusa</i> (Malloch)(Diptera: Agromyzidae) during off-season on a legume weed and its seasonal activity. <i>Indian Journal of Agricultural Sciences</i>, 57(3), 214-215.</p> <p>Kulkarni, S. (1966). Infestation, sex-ratio and damage by <i>Melanagromyza obtusa</i> (Diptera: Agromyzidae) to <i>Moghania macrophylla</i> seeds in the field. <i>Entomologia experimentalis et applicata</i>, 9(3), 323-326.</p> <p>Martínez-Alava, J. O., Serna, F., & Pérez, A. L. (2016). <i>Melanagromyza obtusa</i> (Diptera: Agromyzidae), a new record for Colombia. <i>Agronomía Colombiana</i>, 34(2), 292-294.</p> <p>Mazumdar, S., & Bhuiya, B. (2014). Vegetable leafminers (Diptera: Agromyzidae) and their plant hosts in Bangladesh. <i>Journal of Threatened Taxa</i>, 6(6), 5894-5899.</p> <p>Pandey, N. D. (1962). Studies on the morphology, bionomics and control of some Indian Agromyzidae. <i>Agra University Journal of Research</i>, 11(pt. 2), 39-43.</p> <p>Shanower, T., Lal, S., & Bhagwat, V. (1998). Biology and management of <i>Melanagromyza obtusa</i> (Malloch)(Diptera: Agromyzidae). <i>Crop Protection</i>, 17(3), 249-263.</p> <p>Sithanatham, S., & Sehgal, V. (1985). A survey for offseason survival of pigeonpea podfly around Pantnagar, India.</p> <p>Spencer, K. A. (1973). <i>Agromyzidae</i> (Diptera) of economic importance (Vol. 9). Springer Science & Business Media.</p> <p>Spencer, K. (1990). <i>Host specialization in the world Agromyzidae</i> (Diptera): Kluwer Academic Publishers. London</p> <p>Steck, G. J. (2003). Pigeonpea Pod Fly <i>Melanagromyza obtusa</i> (Malloch)(Agromyzidae). <i>Pest Alert</i>, 1703.</p>
15.	Conclusions	<p>This Quicksan was prompted by the interception of the pigeon pod fly <i>Melanagromyza obtusa</i> on pods of pigeon pea (<i>Cajanus cajan</i>). The organism is not known to be present in the European Union (EU). Conditions do not appear favourable for establishment of <i>M. obtusa</i> in the EU especially because of the absence or limited distribution of its known (and confirmed) host plants. Significant economic impact is not expected if the species were to become established. However, there is some uncertainty whether other species within the Fabaceae, that are present in the EU, could be hosts and seriously be affected.</p>
16.	Follow-up measures	None