Netherlands Food and Consumer
Product Safety Authority
Ministry of Agriculture,
Nature and Food Quality

Quick scan National Plant Protection Organization, the Netherlands

Quick scan number: QS.ENT/2020/001

Quick scan date: 29 June 2020

No.	Question	Quick scan answer for ***Chloridea virescens***
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? *Add picture of organism/damage if available and publication allowed*.	*Chloridea virescens* (Fabricius, 1777)(Lepidoptera: Noctuidae: Heliothinae) [Syn: *Heliothis virescens*] EPPO code: HELIVI Trivial name: Tobacco budworm  (©NVWA)
2.	What prompted this quick scan? *Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.*	Several interceptions during the past decade of different juvenile stages of *Chloridea virescens* on fruit and vegetables of *Asparagus officinalis* from Peru, *Physalis peruviana* from Colombia and *Abelmoschus esculentus* from Mexico and the Dominican Republic.

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3.	What is the current area of distribution?	*Chloridea virescens* can be found throughout North and South America including the Caribbean (EPPO, 2020). Outside the American continent it has been found in Hawaii (Jr, 1982).
4.	What are the hostplants?	*Chloridea virescens* is a polyphagous pest organism known to feed on more than a hundred host plant species including about twenty economically important crops such as *Abelmoschus*, *Allium, Antirrhinum*, *Apium*, *Aster*, *Brassica*, *Capsicum*, *Carica papaya*, *Chrysanthemum*, *Citrus*, *Cucurbita*, several Fabaceae, *Gossypium, Ocimum, Origanum, Phaseolus, Physalis, Pisum,* several Solanaceae, *Tulipa* and *Zea mays* (Blanco et al., 2008; Davidson et al., 1992; Edde, 2018; Gilligan & Passoa, 2014; Traxler & Godoy-Avila, 2004). See also (Blanco et al., 2019; Capinera, 2001; Pogue, 2013) and references therein for more host plants within its native range.
5.	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/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.).*	Yes. Caterpillars feed on buds and blossoms and to a lesser extent on leaves, stalks and petioles or may sometimes enter the fruit (Capinera, 2001) causing damage in many agricultural crops such as those mentioned in Q4.
6.	Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment). a. In greenhouses b. Outdoors c. Otherwise (e.g. storage facilities, human environment)	In its area of origin, *C. virescens* is distributed over a wide range of climates. In the USA, it's unable to overwinter in the northern states, but may survive cold climates in greenhouses and sheltered locations (Capinera, 2001). Diapause occurs in the pupal stage in winter as well as in summer allowing the species to survive cold and hot spells (Butler et al., 1985), but it is not able to survive temperatures below -7°C in the soil. Many host plant species are grown indoors as well as outdoors. a. The organism is not known as a glasshouse pest and establishment in glasshouses is uncertain. Many host plants such as *Capsicum, Solanum lycopersicum, Lactuca sativa, Rosa* and *Chrysanthemum* are, however, grown in glasshouses in the Netherlands. These crops cover a relatively large area of the total glasshouse area. Glasshouses are generally concentrated in certain areas and the pest may be able to, establish in such glasshouse area where host plants are present year round. b. The organism may be able to survive winters in the Netherlands (in sheltered places). Host plants are widespread both in commercial crops as in nature. c. In storage and in human environments where host plants are absent they are not able to develop and survive.
7.	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	Given its occurrence in a wide climatic range, its reproductive and dispersal potential in combination with its polyphagous nature make establishment of *Chloridea virescens* in the EU highly probable. Based on the climatic similarity of *C. virescens* in its home range and

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		circumstances in continental Europe, EPPO mentions the possibility of establishment as 'probably limited to the Southern part of the EPPO region' (EPPO, 2015), but climatic changes in recent years will likely extent the ecological niche of *C. virescens* northwards (Hill et al., 2011).
8.	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)?	Natural dispersal and by human activity such as transport of fruit, vegetables, plants for planting, cut flowers and soil. Rate of spread unknown. *C. virescens* is a migrant species in the adult stage, able to cover large distances in its native range (Capinera, 2001; Landolt, 2008).
9.	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?	The preference of *C. virescens* for flower buds and blossoms may cause yield and quality losses of cut flowers grown in glasshouses. Its capacity to bore into fruits might lower yield of tomato, bell pepper and other glasshouse crops. The insect's polyphagous nature might negatively impact wild herbs and grasses. In Southern EU member states the organism is expected to cause economic losses in field grown crops. Currently *C. virescens* has an A1 status in East Africa and Southern Africa and a quarantine status in Israel (EPPO, 2020). The total export value of Dutch fruit and vegetables to e.g. Israel valued respectively €45 and €46 million in 2018 and 2019 (CBS, 2020). Establishment of *C. virescens* may negatively impact the total export volume and value to an unknown extent.
10.	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? *If "no", go to question 12*	Yes, in end products, see answers Q2.
11.	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)? *Only to be answered in case of an interception or a find.*	Fruit and vegetables of *Asparagus, Physalis* and *Abelmoschus* have a limited shelf life that will be consumed shortly after sale. *Asparagus* will be kept indoors and refrigerated prior to consumption resulting in a small window of opportunity to complete the insect's life cycle on this product. *Physalis* and *Abelmoschus* might be exhibited outdoors at open markets or shop displays for a limited amount of time giving larger caterpillars time to escape and pupate in the open. However, abovementioned storage conditions will generally not allow for transfer from the end product to a crop production facility and the probability of entry through import of these products is assessed to be very low.
12.	Additional remarks	
13.	References	Blanco CA, Rosario-Lebron A, O'Donnell CA, Portilla M, Gullbronson C, Mowery J, Smith-Pardo AH, Stocks I, Nadel H, Trozzo LR, Haslem PS, Young JD, Downes S, Parker T, Walsh T, Tay WT & Oppenheim S (2019) Improving Risk Assessment of Noctuid Pests at North American Ports and Farms by Differentiating Egg Morphology. Annals of the Entomological Society of America 112: 443-450. doi:10.1093/aesa/saz029. Blanco CA, Teran-Vargas AP, Abel CA, Portilla M, Rojas MG, Morales-Ramos JA & Snodgrass GL (2008) Plant host effect on the development of *Heliothis virescens* F. (Lepidoptera: Noctuidae). Environ Entomol 37: 1538-1547. doi:10.1603/0046-225x-37.6.1538.

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		Butler GD, Jr., Wilson LT & Henneberry TJ (1985) *Heliothis virescens* (Lepidoptera: Noctuidae): Initiation of Summer Diapause. Journal of Economic Entomology 78: 320-324. doi:10.1093/jee/78.2.320. Capinera JL (2001) *Heliothis virescens*: Featured Creatures (ed. by JL Gillett-Kaufman) Entomology and Nematology Department, University of Florida. CBS (2020) Statline: Export value of Dutch fruit and vegetables to Israel: CBS. Davidson N, Kinsey MG, Ehler LE & Frankie GW (1992) Tobacco budworm, pest of petunias, can be managed with Bt. California Agriculture 46: 7-9. Edde PA (2018) Principal Insects Affecting Tobacco Plants in the Field. 28: 117. doi:https://doi.org/10.2478/cttr-2018-0013. EPPO (2015) *Heliothis virescens* (Lepidoptera: Noctuidae): EPPO, Paris. EPPO (2020) Chloridea virescens (HELIVI): EPPO Global Database (ed. EPPO. Gilligan TM & Passoa SC (2014) LepIntercept, An identification resource for intercepted Lepidoptera larvae Identification Technology Program (ITP) (ed. USDA-APHIS-PPQ-S&T, Fort Collins, CO. Hill JK, Griffiths HM & Thomas CD (2011) Climate Change and Evolutionary Adaptations at Species' Range Margins. Annual Review of Entomology 56: 143-159. doi:10.1146/annurev-ento-120709-144746. Jr BJW (1982) A key to the late instar larvae of some Hawaiian Noctuidae. Proceedings of the Hawaiian Entomological Society 24: 37-49. Landolt PJ (2008) New geographic records for tobacco budworm, *Heliothis virescens* (Fabricius) (Lepidoptera: Noctuidae), in the Pacific Northwest. The Pan-Pacific Entomologist 84: 246-248, 243. Pogue MG (2013) Revised status of *Chloridea* Duncan and (Westwood), 1841, for the *Heliothis virescens* species group (Lepidoptera: Noctuidae: Heliothinae) based on morphology and three genes. Systematic Entomology 38: 523-542. doi:10.1111/syen.12010. Traxler G & Godoy-Avila S (2004) Transgenic cotton in Mexico. AgBioForum 7: 57-62.
14.	**Conclusions**	This Quick scan was prompted by the interception of immature stages of *Chloridea virescens* on fruit and vegetables imported from countries in North and South America. The organism is not known to be present in the EU. The organism can likely establish in southern EU member states but the northern border of it is potential area of distribution is uncertain. If the organism would become established, it is expected to cause economic impact in various crops.
15.	**Follow-up measures**	The organism will be considered as a potential Union quarantine pest based on article 29 of Regulation 2016/2031. Consignments that are found infested with the organism will be rejected.