Quick scan number: ENT–2012-03

Quick scan date: 11 September 2012

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*.	***Anthonomus eugenii* Cano, Pepper weevil** Coleoptera, Curculionidae, Curculioninae, Anthonomini Dimensions of adult: 2 - 3.5 mm (**White, 1983**)  Larval damage (source: NVWA)  Exit hole of adult weevil (source: NVWA)  Egg deposit on young pepper fruit (source: NVWA)  Adult (source: Sarah McCaffrey Museum Victoria on www.padil.gov.au **)**

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.*	A grower of sweet pepper, *Capsicum annuum*, in Honselersdijk contacted the NVWA on Thursday 19th of July about observations of a population of beetles and damaged peppers.
3	What is the (most likely) area of distribution?	USA: mainland and Hawaii Central America and Caribbean: Belize, Costa Rica, Dominican Republic, Mexico, Nicaraqua, El Salvador, Guatemala, Honduras, Jamaica, Panama, Puerto Rico Oceania: French Polynesia **(Cabi Crop Compendium, 2012; Eppo Datasheet, 1995; Rodriguez-Leyva, 2006; Schultz & Kuhar, 2008)**
4	Has the organism been detected, sighted and/or has it established itself in nearby countries (DE, BE, LU, FR, UK) *Yes/no. If 'yes', provide details. No interceptions*	No.

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 + host plants + short explanation of symptoms. Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).*	Yes. The pepper weevil is considered one of the most important insect pests of all cultivated varieties of chile pepper (*Capsicum* spp.) in the New World. The pepper weevil lays eggs and feeds on and develops completely inside the floral buds and immature fruits. Premature abscission is often a consequence of feeding and developing inside buds and fruits resulting in loss of production (**Rodriguez-Leyva, 2006**). Host plants utilized by pepper weevil for reproduction are confined to the genera *Capsicum* and *Solanum*, both in the family Solanaceae. All of the five species of pepper grown as crops : *C. annuum*, *C. frutescens, C. chinense*, *C. pubescens or C. baccatum* are suitable for oviposition and development of the pepper weevil (**Elmore et al. , 1934; Wilson, 1986; Patrock and Schuster, 1992**). Non-Capsicum solanaceous host plants used by the pepper weevil on which successful development takes place, are: *Solanum americanum, S. carolinense, S. dimidiatum, S. eleganifolium, S. melongena, S. pseudocapsicum, S. pseudogracile, S. ptycanthum, S. rostratum, S. triquetrum* (**Rodriguez-Leyva, 2006; Wilson, 1986; Patrock & Schuster, 1992**). The black nightshade, *Solanum nigrum*, is also a host plant on which the life cycle can take place ((**Mellinger & Bottenberg, 2000).** Symptoms: Adults feed on leaves and blossoms and the newly developed adults exit fruits by boring holes in the fruits. Early signs are small holes in immature fruits and small circular or oval holes (2-5 mm in diameter) in leaves. These can be mistaken for slug or caterpillar damage. Larvae feed on seeds and other tissue inside the developing fruits, where they pupate **(Costello and Gillespie, 1993; Elmore & Campbell, 1951; Capinera, 2008).** Their presence can result in discoloured and deformed fruits and, more importantly, the premature ripening and abscission of young fruits. The pepper weevil has been implicated in the transmission of internal (*Alternaria*) mold of peppers (**Bruton et al., 1989).** List of symptoms/signs: Fruit : abnormal shape, premature drop , lesions, obvious exit hole, discoloration. Inflorescence: premature ripening and drop, feeding signs. Leaves: small round holes.
6	If the organism would become established in the Netherlands, what kind of damage would it likely cause ? *Indicate whether damage is expected to be comparable or different to that in area of present distribution : see question 5.*	The kind of damage is expected to be similar to the damage in its current area of distribution as described in paragraph 5.
7	Which commercially grown host plants are present and which host plants are present in the natural environment in the Netherlands? *If establishment is restricted to greenhouse climate, list only host plants in greenhouses.*	*Capsicum* spp. *Solanum melongena* *Solanum* pot plants and *Capsicum* pot plants Solanaceous weeds such as black nightshade, *Solanum nigrum.*
8	Provide a provisional estimation of type and probable amount of direct and indirect economic damage (e.g.	- Main cause of yield loss is fruit and bud abortion and damage to immature fruits. The damage to flowers and/or young pods causes abscission and diminishes yield up to 30 to 90% if treatment is

	lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established?	not implemented (**Rodriguez-Leyva, 2006 -** original references: Campbell, 1924; Elmore et al., 1934; Goff and Wilson, 1937; Velasco, 1969;Genung and Ozaki, 1972; Riley and Sparks, 1995). In 1990, losses in the United States due to the pepper weevil were estimated at 23 million dollars on the 31,000 ha grown in California, New Mexico, Florida and Texas (**Riley and King 1994**). -Countries may close their markets or implement specific requirements for import of Dutch *Capsicum* fruits. -Survey and inspection costs increase. -Integrated and biological control of other pests is threatened by the insecticide applications needed to control the pepper weevil.
9	What are the possibilities of spreading, either by natural dispersal or human activity?	The weevil can fly and migrate to other host plants in neighbouring fields or greenhouses. Larvae and emerging weevils can be spread by transporting *Capsicum* and possibly *Solanum* fruits (**CABI Crop Protection Compendium, 2012**).
10	In what manner could the organism enter the Netherlands? *Mention pathways*.	Import of *Capsicum* fruits Solanaceous pot plants with fruit and import of *Solanum f*ruits.
11	Has the organism been detected on/in a product (cut flowers, fruit...) destined for the consumer market? *If "no", please go to question 14*	Yes.
12	If the organism has been found on/in a consumer product, are there any risks of introduction and establishment in crop areas and/or natural environment in the Netherlands?	Yes, year round survival on glasshouses crops and during the spring/summer/autumn on host plants outdoors. During winter when host plants are available and temperatures stay above zero, survival may occur (**Costello & Gillespie 1993)**
13	Additional remarks	In 1999 the Plant Protection Service intercepted larvae of *Anthonomus eugenii* on *Solanum melongena* fruit from Dominican Republic at Schiphol Airport (**De Goffau, 2000**). Experience in Canada shows that *A. eugenii* has the potential to be a serious pest of glasshouse crops. The population was successfully eradicated. (**Costello & Gillespie, 1993).** In the fall of 2009, pepper weevil was reported in six greenhouses in the Leamington area of Ontario. Imported fresh peppers were the suspected pathway, but this has not been verified. Many production greenhouses in Canada also repackage and distribute pepper fruit produced at other Canadian greenhouses or imported from infested countries. The import of fresh peppers from infested countries is the suspected source of the previous infestations of this pest within Canada. Greenhouse facilities that import peppers from infested areas are likely to encounter pepper weevil. (**Anonymous, 2011)** Listed on A1 EPPO list .

		Life history information : (**Rodriguez-Leyva, 2006, Topoanta et al., 2005)** See also **Riley, 1990,** for life cycle illustration. The generation time lasts 22.7, 13.9 and 12.9 days under temperature conditions of 21.0, 27.0 and 30.0 °C, respectively, and 60% RH and 14:10 L:D conditions (**Topoanta et al., 2005).** Longevity of adults range from 31.7 to 90 days. The total number of eggs laid can amount to 341 (**Rodriguez-Leyva, 2006).**
14	References:	Anonymous, 2011. RMD-10-28: *Anthonomus eugenii* (pepper weevil) - Pest Risk Management Document CanadianFoodInspection Agency,Ottawa, Ontario, Canada, Date Issued: 2011-02-15 on http://www.inspection.gc.ca/plants/plant-protection/directives/risk-management/rmd-10-28/eng/1304792116992/1304821683305 (seen on 2012-07-26). Bruton, B.D., Chandler, L.D.,Miller, M.E., 1989. Relationships between pepper weevil and internal mold of sweet pepper, Plant Disease 73 (2) 170-173 Costello, R.A.& Gillespie, D.R.,1993. The pepper weevil, *Anthonomus eugenii* as a greenhouse pest in Canada. IOBC Bulletin 16 (2), 31-34. Cabi Crop Protection Compendium datasheet on *Anthonomus eugenii*, last modified 12 June 2012. Capinera, J. L., 2008. Pepper Weevil, *Anthonomus eugenii* Cano (*Insecta: Coleoptera: Curculionidae*). EENY-278 (IN555), Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Published, November 2002. Revised, September 2008 and 2011. 6 pp. De Goffau, L.J.W., 2000. Larvae of *Anthonomus* cf. *eugenii* in fruits of eggplants from the Dominican Republic. Verslagen en Mdedelingen Plantenziektenkundige Dienst Wageningen 201 (annual Report Diagnostic Centre 1999): 56 EPPO, 1995. Data sheets on Quarantine Pests, Anthonomus eugenii, www.EPPO.org. Elmore, J.C., A.C. Davis & R.E. Campbell, 1934. The pepper weevil. USDA Technical Bulletin No. 447. Elmore, J.C. & R.E. Campbell, 1951. The Pepper Weevil U.S. Department of Agriculture, Leaflet No. 226, 7 pp Mellinger, H.C & H. Bottenberg, 2000. Commercial implementation of bio intensive IPM in pepper production systems. SBIR Phase II Final Report No. FLAK-9703371, 34 pp. Patrock, R. J.& D. J. Schuster, 1992. Feeding, oviposition and development of the pepper weevil (*Anthonomus eugenii*) on selected species of Solanaceace. Tropical Pest Management 38, 65-69.

		Riley, D.G., 1990. Refined Sampling Methodology and Action Thresholds for the pepper weevil. PhD Thesis Univ. Fla, 179 pp. Riley, D.G. & E.G. King, 1994. Biology and Management of pepper weevil *Anthonomus eugenii* Cano (Coleoptera: Curculionidae): a review. Trends Agric. Science 2: 109-121. Rodriguez-Leyva, E., 2006. Life history of *Triaspis eugenii* Wharton and Lopez-Martinez (Hymenoptera: Braconidae) and evaluation of its potential for biological control of pepper weevil *Anthonomus eugenii* Cano (Coleoptera: Curculionidae). PhD thesis University of Florida, 110 pp Schultz, P. B.& T.P. Kuhar, 2008. First record of pepper weevil infestation in Virginia. Plant Health Progress 2008 No. January pp. 0118-01 http://www.plantmanagementnetwork.org/pub/php/brief/2008/pepper/ Toapanta, M.A., D.J. Schuster & P.A. Stansly, 2005. Development and life history of *Anthonomus eugenii* (Coleoptera, Curculionidae) at constant temperatures, Environmental entomology, 34(5), p. 999-1008. Wilson, R.J., 1986. Observations on the behaviour and host relations of the pepper weevil *Anthonomus eugenii* Cano (Coleoptera: Curculionidae) in Florida. M.S. Thesis Univ. Fla. Gainesville, 94 p. White, R.E. , 1983. Beetles, Peterson Field Guides.
15	**Conclusions**	The pepper weevil, *Anthonomus eugenii,* is present in Central America, USA and French Polynesia. It can cause high yield losses in pepper and is difficult to control because of the hidden life stages in the fruits (eggs, larvae, pupae and young adults). It is a new pest for the Netherlands and Europe. Fruits of *Capscium* have been indicated as the main pathway for introduction but presently, it is unknown how the pest entered the Netherlands.
16	**Follow-up measures**	- Official eradication measures and a survey have been conducted - A Pest Risk Analysis (PRA) will be prepared