

Screening of Emerging risks in Norway (ERIN). Judgments are preliminary and should not be considered as part of a final risk assessment:

Drosophila suzukii (Matsumura, 1931)

1. Taxonomic position: Arthropoda, Insecta, Diptera, Drosophilidae. **Popular names:** Cherry vinegar fly, Spotted wing drosophila, cherry fruit fly, cherry drosophila (English), La drosophile du cerisier (French), Kirschessigfliege (German), yīng táo guǒ yíng (Chinese), ôtô-syôzyôbae, ôtô-shôjôbae, Suzuki-shôjôbae, Tsumaguro-shôjôbae (Japanese), flekkvingefruktflue (Norwegian).

2a. Status in Norway:

Established <input type="checkbox"/>	Intercepted but not established <input checked="" type="checkbox"/>	Not intercepted <input type="checkbox"/>
--------------------------------------	---	--

If intercepted or established, provide supplementary information:

The species has been recorded in 2016 in berries imported for fresh consumption, from Belgium, Netherlands, Portugal and Spain. NIBIO is currently carrying out a small survey in supermarkets/food shops in Ås and Sandefjord. The investigation is still ongoing, and the results to date showed that seven (7) out of 30 samples contained *D. suzukii* (larva and/or adults), i.e. 23.3% of the samples were infested. There is no evidence of establishment of *D. suzukii* in Norway. However, the species is established in Denmark and Southern Sweden (to Skåne), and qualifies as an emerging risk (door-knocker) to Norway.

2b. If this species is already established in Norway and this assessment is limited to a part of Norway where it may expand, define this part area of Norway:

3. Area of native distribution in the world and information about introductions, expansions and eradications:

The species is thought to be native in eastern and southeastern Asia, including China, Japan (but for Japan an early century introduction could also be possible) and Korea, although little is known about its geographical origin. The species is endemic in Asia. It was first recorded as invasive in Hawaii in 1980, and then simultaneously in California and in Europe in 2008. Since 2008, it has spread rapidly throughout the temperate regions of North America and Europe, due to increasing global fresh fruit trade (host fruits) and the initial lack of regulation over the spread of any *Drosophila*. The species was recently (2015) recorded in Iran, indicating further geographical expansion also into the Middle East.

Eradication programs have not been attempted either in Europe or in the US, because by the time the species was detected it had already established itself to such an extent that eradication was deemed impossible in both continents.

4. Sector in Norway expected to be impacted by the species (related to question 10 below):

Agriculture <input checked="" type="checkbox"/>	Forest(ry) <input type="checkbox"/>	Ornamental/park/garden <input checked="" type="checkbox"/>	Fruit orchard/garden <input checked="" type="checkbox"/>
Greenhouse/protected <input checked="" type="checkbox"/>	Other sector, or not relevant <input type="checkbox"/> Describe:		

5. Susceptible host(s) and/or type of environment(s) in Norway:

D. suzukii is an invasive pest of ripening soft fruits. The species attacks both cultivated and wild hosts. The list of reported as well as probable (potential) host plants are increasing as the species spread to new areas. Economic important and major hosts are *Prunus spp.* (mainly sweet cherries), *Vaccinium spp.* (blueberries), *Rubus spp.* (e.g. raspberries and blackberries), *Fragaria ananassa* (strawberries).

6. Description of damage:

D. suzukii is one of the few *Drosophila* species being able to feed on healthy ripening fruits still attached to the plant. The larvae feed on the fruit pulp inside fruit and berries, causing the fruit to collapse. The oviposition scar exposes the fruit to secondary attack by pathogens and/or other insects, which may contribute to further deterioration.

7a. How is the overall probability of entry in Norway, or in a defined part of Norway?

0. not relevant <input type="checkbox"/>	1. very low <input type="checkbox"/>	2. low <input type="checkbox"/>	3. medium <input type="checkbox"/>	4. high <input type="checkbox"/>	5. very high <input checked="" type="checkbox"/>
--	--------------------------------------	---------------------------------	------------------------------------	----------------------------------	--

Level of uncertainty:	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>
-----------------------	---	---------------------------------	-------------------------------

The key (major) pathway for the introduction of *D. suzukii* into new areas is imported host fruits from countries where the pest occurs. Its rapid dispersal worldwide is in part due to increasing global fresh fruit trade and the cryptic nature of (eggs) larvae hidden inside fruit, which means they are often undetected until after transportation. Fruits and berries are imported to Norway throughout the year. Other minor pathways are plants for planting that are traded in containers where pupae could hide or host plants carrying fruits, as well as cut flowers. The potential for introduction is very high (see also section 2 above), while the level of uncertainty is low.

7b. How is the overall probability of establishment in Norway, or in a defined part of Norway?

0. not relevant <input type="checkbox"/>	1. very low <input type="checkbox"/>	2. low <input checked="" type="checkbox"/>	3. medium <input checked="" type="checkbox"/>	4. high <input type="checkbox"/>	5. very high <input type="checkbox"/>
--	--------------------------------------	--	---	----------------------------------	---------------------------------------

Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
-----------------------	------------------------------	---------------------------------	--

Establishment potential depends on a number of factors: The time of year (i.e. suitable hosts must be available), the proximity to host plants, and the local climatic conditions. Establishments of the species at rather high altitudes in Switzerland (and France), and more recent in Denmark and Southern Sweden, combined with the required degree-day accumulation for this species, indicates that establishment in some areas of Norway may occur. Wild hosts, such as blueberries, are available in almost all parts of Norway. The most critical factor for establishment of the species in Norway is overwintering, as the species overwinter in the adult stage, and may depend on overwintering sites associated with human habitation. There is a lack of research on the different factors determining overwintering success of this species. In addition, climate change may affect its potential for spread and establishment to more northern regions in the future. The conclusion for probability of establishment is low-medium, while the level of uncertainty is high.

8. How fast is the pest expected to expand in Norway, or in a defined part of Norway?

< 0.3 km per year <input type="checkbox"/>	0.3 - 10 km per year <input checked="" type="checkbox"/>	10 - 30 km per year <input type="checkbox"/>	> 30 km per year <input type="checkbox"/>
--	--	--	---

Level of uncertainty:	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>
-----------------------	------------------------------	--	-------------------------------

D. suzukii has a high reproductive rate with a short generation time. *D. suzukii* can theoretically have up to 13 generations per year, which may contribute towards its rapid spread, given available suitable hosts. Such figures are not likely to occur in Norway. It is estimated that the species is able to spread 1400 km a year, however, it is not clear if the estimated dispersion was active or passive via infested fruits.

9. How large percent of potential environment type in Norway, or in a defined part of Norway, is expected to be colonized?

< 5 % <input type="checkbox"/>	5 - 10 % <input checked="" type="checkbox"/>	10 - 20 % <input type="checkbox"/>	20 - 40 % <input type="checkbox"/>	> 40 % <input type="checkbox"/>
--------------------------------	--	------------------------------------	------------------------------------	---------------------------------

Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
-----------------------	------------------------------	---------------------------------	--

The estimate is an assumption based on the climatic limitations the species will encounter in the different Norwegian horticultural production areas.

10. How great a negative effect is the pest likely to have on economy including costs of control measures for the impacted sector in Norway, or in a defined part of Norway? Rate possible effects:

0. not relevant <input type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input type="checkbox"/>	3. moderate <input checked="" type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
--	-------------------------------------	-----------------------------------	---	-----------------------------------	-------------------------------------

Level of uncertainty:	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>
-----------------------	---	---------------------------------	-------------------------------

Significant economic damage has been reported in North America and Europe from strawberries, apricots, sweet cherries, raspberries, Himalayan black berries, evergreen blackberries, other blackberries and blueberries. 20-100% crop losses are recorded, depending on host plant and local climatic conditions, however, the species is sensitive to local climatic factors and different patterns of damage are observed.

Migration between cultivated land at different altitudes (offering a differentiated and extended fruit ripening period), proximity of forest and uncultivated or marginal areas with susceptible wild fruits, may foster the development of *D. suzukii*, if the species becomes established in Norway.

11. How important is the environmental impact likely to be in Norway, or in a defined part of Norway? Rate possible effects:

0. not relevant <input type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input checked="" type="checkbox"/>	3. moderate <input checked="" type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
--	-------------------------------------	--	---	-----------------------------------	-------------------------------------

Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
-----------------------	------------------------------	---------------------------------	--

Increased use of pesticides in the production of susceptible crops. Possible impact on wild blueberries and on organism dependent on blueberries in nature (see social damage under 12).

12. How important is social damage likely to be in in Norway, or in a defined part of Norway? Rate possible effects:

0. not relevant <input type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input checked="" type="checkbox"/>	3. moderate <input checked="" type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
--	-------------------------------------	--	---	-----------------------------------	-------------------------------------

Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
-----------------------	------------------------------	---------------------------------	--

Increased use of pesticides close to the time of harvest may give levels of pesticide residues in the products above maximum limits, and could therefore force producers to abandon production of certain crops in the invaded area.

If the species becomes established in Norway significant damage to wild blueberries and raspberries (ecosystem services) may also occur.

13. Priority in Norway versus EPPO and EU:

Since 2008 *D. suzukii* has spread rapidly throughout the temperate regions of North America and Europe, due to global trade and the initial lack of regulation over the spread of any *Drosophila*. The species is listed on the EPPO A2 list of pests recommended for regulation as quarantine pest. However, the species is not regulated in Europe, because at the time it was detected it had already established itself to such an extent that eradication was deemed impossible. The NPPO of Norway has decided not to regulate this invasive pest.

14. Specific questions for Norway:

A number of hosts of *D. suzukii* are widespread in Norwegian orchards, tunnels, private gardens, public areas and in the wild, therefore host plants is not a limiting factor for the species. Local climatic conditions and particularly overwintering sites is essential for establishment and spread of the species in Norway. Presently, there is a lack of knowledge regarding cold tolerance and

overwintering of the species in areas with prolonged and harsh winter conditions, and it is therefore not yet possible to predict further expansion of the species in northern Europe.

An early warning system to detect *D. suzukii* at an early stage and thereby be able to take rapid response measures should be considered vital in areas (Norway) currently free of the species.

15. Existing assessments:

No risk assessment has been conducted for Norway. A pest risk analysis (PRA) was produced by EPPO in 2010. This PRA contains detailed assessment of the climate suitability (using CLIMEX) of the PRA area for establishment. It should be noted that such assessments is quite often not accurate for Norwegian conditions due to the variety in topography and great variety in microclimatic conditions between rather close locations. CABI has developed a data sheet report for *D. suzukii* in their Invasive Species Compendium, including lists of host plants, distribution- lists and maps. Range expansions due to global warming have not been taken into account in any these documents. In addition, the pest is under quarantine regulation by New Zealand and Australia since 2010, but these two PRAs have not been consulted during this exercise.

16. Requested assessments:

None

17. Recommended type of assessment:

A PRA for Norway is recommended, since Norway is an area currently free of the species. Or at least an assessment focusing on developing an early warning and rapid response system for *D. suzukii* in Norway.

References

Vedlegg 1. PM 5/3(5). Decision-support scheme for quarantine pests (version 2011). EPPO. Kan lastes ned her: <http://archives.eppo.int/EPPOStandards/prah.htm>.

Vedlegg2. Guidance to the questions 7 and 10 in the scheme

Calabria, G., Máca, J., Bächli, G., Serra, L. & Pascual, M. 2010. First records of the potential pest species *Drosophila suzukii* (Diptera: Drosophilidae) in Europe. Journal of Applied Entomology 136: 139-147. doi: 10.1111/j.1439-0418.2010.01583.x

Datasheet report for *Drosophila suzukii*. 23 September 2016. Invasive species compendium. CABI. <http://www.cabi.org/isc/datasheet/109283>

Pest risk analysis for: *Drosophila suzukii*. EPPO 2010. 11-17189. http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm