

Outline guidance on Dothistroma needle blight (DNB) resilience action plans for forest tree nurseries in Scotland

The aim of nursery resilience action plans is to describe the nursery business, explain the previous impacts of DNB and then outline the measures that will be taken to: minimise the risk of DNB entering the nursery in future years; and maximise the likelihood of containment should the disease occur. The measures must be implemented within 12 months and remain in place for a minimum of three further years.

An approved (by FCS) nursery resilience action plan is a qualifying requirement for consideration of any payments under the Forest Tree Nursery Transition Scheme (Scotland).

Certain other conditions will apply to the above Transition Scheme:

- Inspections of nurseries and current regulatory measures will remain in place for the foreseeable future.
- Provision of accurate, mapped stocking information must be made available: nursery layout, bed lay out, seed lot information – this including species, provenance, seed lot ID, age of stock, chemical applications (date, volume etc), number of beds, length of beds, number of plants, other growing practices etc.
- Chain-of-custody is required from the nursery to at least the initial buyer. FCS will investigate ways of extending this to planting sites via SRDP support measures.

The following will define the locational risk of pine-producing nurseries:

- Low risk location:** No DNB and no pine within 5 km of the nursery.
- Medium risk location:** Pine present within 5 km of the nursery but no known DNB within 550m.
- High risk location:** Pine present within 5 km of the nursery and DNB detected within 550m.

Depending on the risk-rating of the nursery's location, the following survey actions will be required:

Low risk

- No action required as long as no new pine is planted within 5km of the nursery.

Medium and High risk

- By June 2012, survey within 550m of the nursery boundaries to record and map the presence of pine and the presence/absence of DNB. Repeat annually thereafter.
- The nursery must take (and record) pro-active steps to contact owners of infected pine trees within 550m of the nursery to seek those trees' removal.

In addition to the above mandatory measures, FCS **strongly advise** nurseries to maintain DNB vigilance out to 5km from their boundaries.

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NB:

FCS Conservancy staff can be called upon for assistance in relation to felling licences, forest plans amendments, grants etc but will not be get involved in negotiations outside that context).

FCS will, on request, provide (free of charge) data from FES surveys of any known infections on land managed by FES.

Presence of DNB to be confirmed through laboratory analysis of samples by Forest Research.

1. Stocking options

a) *Seed versus plants*

- i. Seed presents a significantly lower risk than plants.
- ii. Bringing pine plants in from other countries presents the highest risk (introduction of different mating and genotypes of *Dothistroma septosporum* and the second causal agent of DNB, *D. pini*) but there are also risks associated with bringing stock in from other GB nurseries (introduction of different mating types and genotypes of *D. septosporum*).
- iii. Should plants be brought in from any other nurseries, FCS must be notified. FCS will then decide whether additional testing will be required at the appropriate time and by an agreed body.
- iv. Seed hygiene – i.e. free from plant debris OR seeds should be extracted from cones using an appropriate heating process i.e. temperatures of 40°C + (and ideally should also have minimum needle debris).

Existing risk and mitigation measure

- *Low risk - clean seed.*
- *Medium risk – competent inspection of GB plants and non-GB plants.*
- *High risk - uninspected GB and non-GB plants.*

b) *Species and provenances*

- i. *P. contorta var latifolia* (lodgepole pine) - current knowledge suggests that Inland provenances are more highly susceptible than the Coastal and Alaskan provenances/origins.
- ii. *P. nigra* sp. (Black pine species) – Corsican (*P. nigra* ssp. *larico*) and Austrian pine (*P. nigra* var. *nigra*) are both known to be highly susceptible.
- iii. *P. sylvestris* – previously this species was considered to be of low susceptibility. However, there have been a large and increasing number of reports of DNB on this species over the last 3 years. Work is currently underway to assess the impact of the disease on this species.

Existing risk and mitigation measure

- *Low risk - low susceptibility pine species.*
- *Medium risk - moderate susceptibility pine species and provenances/origins*
- *High risk - high susceptibility pine species and provenances/origins.*

c) *Percentage of pine as a proportion of the entire nursery operation*

- i. The greater the proportion of pine the higher the risk, and the greater the proportion of highly susceptible pines the greater the risk. This is a risk-based matter for the nursery to consider.

Existing risk and mitigation measure

- *Low risk - low (<10%) proportion of pine.*
- *Medium risk – (11-25%) moderate proportion of pine.*
- *High risk – (>25%) high proportion of pine.*

2. Nursery Practices

a) Awareness raising

- i. Training of nursery staff to increase understanding of DNB i.e. implications, detection and mitigation measures.
- ii. Staff, visitors and public awareness – simple explanatory notices.

Existing risk and mitigation measure

- *Low risk – formal staff training and clear notices.*
- *Medium risk - notices only.*
- *High risk – no awareness raising.*

b) Biosecurity

Infected needles present the highest risk. Introduce measures to minimise spore and needle movement (needle debris can be imbedded in soil).

- i. Clothing – remove needle debris from clothing and boots on entry to the nursery; wash and disinfect boots prior to entering operational areas.
- ii. Vehicles, machines and equipment - remove needle debris (wash and disinfect wheels and wheel arches) at entry to the nursery if access to operational areas is intended; wash and disinfect relevant working parts of operational machines i.e. cutting, lifting, planting tools between seed lots.
- iii. Sterilise beds where infection has occurred.
- iv. Statutory control measures must be implemented.

Existing risk and mitigation measure

- *Low risk - high biosecurity implementation.*
- *Medium risk - partial biosecurity implementation.*
- *High risk - no biosecurity implementation.*

c) Fungicides

Copper based fungicides have been shown to be effective in a number of studies. An outline example of a suggested fungicide strategy:

- i. Chemical type - 5 kg of copper oxychloride 50% wettable powder in 500 litres of water per net ha plus 0.25% organo-silicone added to the mixture to increase efficacy of the spray on target plants.
- ii. Application methods - A nozzle capable of providing a droplet size of a of 300 micron diameter or smaller
- iii. Timing and frequency of application – ideally fortnightly treatments when needles are extending and monthly treatments thereafter during the growing period.

Existing risk and mitigation measure

- *Low risk - competent development and implementation of fungicide strategy.*
- *Medium risk - lack of competent strategy and/or sub-optimal fungicide implementation.*
- *High - no fungicide application.*

d) Exposure period

- i. The longer stock is held over in the nursery, the greater the risk.
- ii. For containerised stock, the longer the period under cover the less the risk.

Existing risk and mitigation measure

- *Low risk - stock 1 year old or less; containerised stock not held outdoors during main infection period (mid May to mid August).*
- *Medium risk - stock 2 to 3 years old or less; containerised stock not held outdoors during main infection period (mid May to mid August).*
- *High risk - stock older than 3 years. No limit to containerised stock exposure outdoors.*

e) Stock position

- i. The closer stock is planted to previous nursery infection sites, known non-nursery infections and non-nursery pine, the greater the risk.
- ii. The greater the distance between seed lots, the lower the risk for inter-bed movement of spores i.e. a minimum distance of 10m between seed lots.
- iii. Windbreaks – should not be pine!

Existing risk and mitigation measure

- *Low risk - no previous infection, stock planted away from known non-nursery pine and infections, and a minimum of 10m between pine seed lots.*
- *Medium risk - previous infection but stock planted away from known non-nursery pine and infection, and a minimum of 10m between pine seed lots*
- *High risk - previous infection and no stock positioning measures taken.*

f) Reduction in humidity levels

- i. Poor weed control increases the severity of DNB and decreases tree vigour.
- ii. Containerised stock held outdoors is at greater risk than equivalent transplant stock due to its higher stocking density (increased humidity).

Existing risk and mitigation measure

- *Low risk - competent weed control strategy and effective implementation.*
- *Medium risk - poor weed control.*
- *High risk - no strategy or weed control.*

Mitigation assessment by FCS

The existing risk level and the resultant risk level associated with actions proposed in the resilience plans will be scored as low, medium or high risk. The risk posed by the nursery location will also be scored as low, medium or high. In order to qualify for the transition package, the risk following mitigation measures must reach the 'minimum acceptable risk' as shown in the table below, and score as 'Low' risk in at least five of the categories.

Table 1 – Assessment of mitigation proposals -

Risk and mitigation		Existing risk	Risk following mitigation	Minimum acceptable risk
Stock options	Seed vs. plant			Medium
	Species/provenance			High if % pine low Medium if % pine medium
	Percentage pine			Medium
Nursery Practices	Awareness			Medium
	Biosecurity			Medium
	Fungicide			Low
	Exposure			Medium
	Position			Medium
	Humidity			Low