Before you plant

Assessing urban tree diversity and potential pest–host associations in planting plans

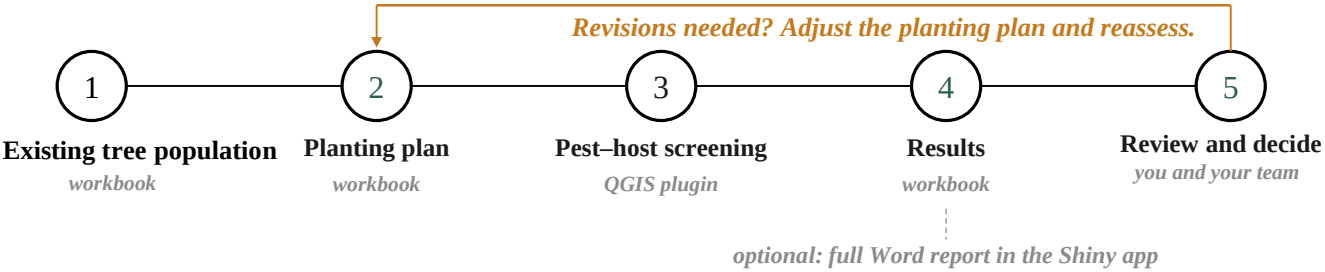
Urban tree planting plans are developed considering site conditions, available budgets, and nursery stock. Before finalising a planting plan, two additional aspects should be assessed: tree diversity and potential associations with regulated pests. By combining data on the existing tree population with proposed plantings and removals, this assessment shows how the plan would affect the taxonomic composition and diversity of the urban tree population.

1 **Assessment of urban tree diversity**
The relative abundance of species, genera and families is compared with two established tree diversity guidelines to assess potential changes in taxonomic diversity.

2 **Identification of potential hosts of regulated pests**
Each species proposed for planting is screened using the FREE3 QGIS plugin against pest–host associations for the 11 regulated pests included in the database.

The two guidelines *share of all trees*	**10–20–30 rule** *Santamour 1990*	**Melbourne targets** *City of Melbourne 2012*
	species ≤ 10% · genus ≤ 20% · family ≤ 30%	species ≤ 5% · genus ≤ 10% · family ≤ 20%

The five steps



Step	*What to do*	*Expected output*
1 Existing trees	**Sheet 'Current trees', columns A–B.** Enter each tree species as 'Genus species' in column A and the corresponding number of trees in column B, using the existing tree inventory or the species table from the FREE3 report..	Automatically calculated proportions of each species, genus and family in the existing tree population.
2 Planting plan	**Sheet 'Planting plan', columns A–C.** Enter the proposed species in column A, the number of trees to be planted in column B and the number to be removed in column C. Use the same species names as in Step 1.	Projected proportions of each species, genus and family after implementation of the planting plan.
3 Pest–host screening	**FREE3 QGIS plugin (User Guide, pp. 46–49).** Screen the proposed species using the plugin. Record classification from the pest-risk layer in column D. If QGIS is unavailable, consult the colleague responsible for the FREE3 report.	Pest–host classification for each proposed species: 'Major host', 'Host' or 'No known risk'.
4 Results	**Sheet 'Results', column 'Check'.** Compare the existing and projected tree populations against both diversity benchmarks. Review the results and comments for each species.	'Indication of improvement or deterioration at species, genus and family levels, together with compliance status for both guidelines.
5 Decision	Review the assessment results and retain or revise the planting plan as appropriate. Repeat the assessment after any changes.	A planting plan supported by documented tree diversity and pest–host screening results.

! Important: The existing tree inventory and the planting plan must cover the same geographical area (e.g. the entire city or a specific district). Otherwise, the calculated proportions and comparisons will not be valid.

What the check does not do

The assessment does not evaluate species suitability for local site conditions, soil or future climate, nor does it predict pest occurrence. Pest–host screening is limited to the 11 regulated pests included in the FREE3 database. Other factors, including tree survival, costs, nursery availability, invasiveness and allergenic potential, are not assessed.The calculations are based on tree numbers rather than size or age. Newly planted saplings and mature trees are therefore weighted equally, although their contributions to canopy cover and shade differ considerably and develop over time.Importantly, 'Not checked' and 'No known risk' should not be interpreted as evidence of safety.

Understanding the assessment results

The projected number of trees is calculated by adding proposed plantings and subtracting planned removals from the existing tree population. The relative abundance of each species, genus and family is then calculated as a percentage of the projected total number of trees. Genera are identified from species names, while families are assigned using the APG IV classification.

Interpreting the “check” results

Major host of a regulated pest: reconsider	*A major host has been identified in the FREE3 screening.*
Species, genus or family above its limit	*At least one 10–20–30 threshold is exceeded.*
Within 10–20–30, above a Melbourne target	*At least one of the stricter Melbourne targets is exceeded.*
OK for diversity; pest–host class not checked yet	*Diversity thresholds are met, but pest–host screening is incomplete.*
No flags; safety not assured.	*None of the preceding conditions applies.*

A worked example

A city with 4,820 trees prepares two versions of a 300-tree planting list. Both fell 20 old plane trees. Figures and species are illustrative, not recommendations.

Plan A · Conventional planting

species	*plant*	*fell*	*check*
Platanus × hispanica	80	20	major host*
Acer platanoides	40	–	species 8.8% > 5%
Tilia cordata	30	–	species 9.5% > 5%
Ostrya carpinifolia	40	–	not checked
Styphnolobium japonicum	40	–	not checked
Liquidambar styraciflua	30	–	not checked
Quercus cerris	40	–	not checked

300 planted · 20 felled · 5,100 trees after

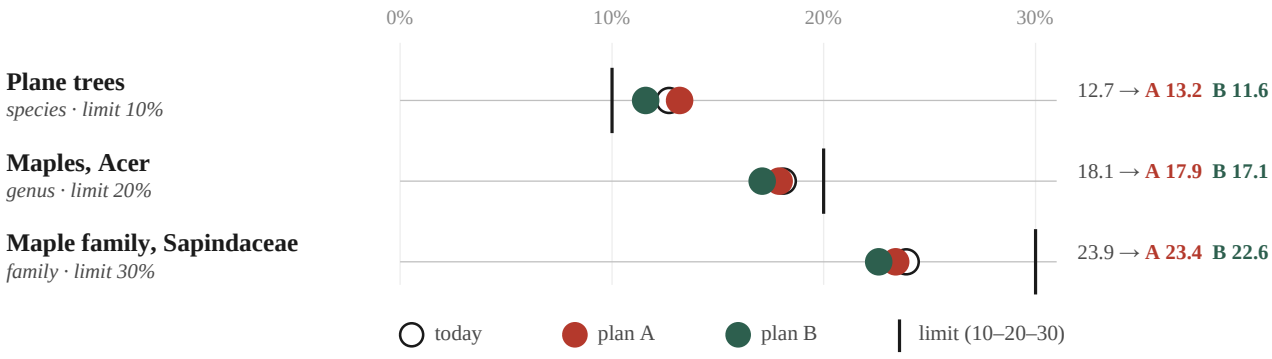
Plan B · Diversified planting

species	*plant*	*fell*	*check*
Platanus × hispanica	0	20	felling only
Ostrya carpinifolia	60	–	not checked
Styphnolobium japonicum	60	–	not checked
Liquidambar styraciflua	50	–	not checked
Quercus cerris	50	–	not checked
Zelkova serrata	40	–	not checked
Ginkgo biloba	40	–	not checked

300 planted · 20 felled · 5,100 trees after

The check displays only the highest-priority warning. In Plan A, plane trees are classified as major hosts, although their projected share (13.2%) also exceeds the 10% species limit.

Share of all trees



Planted trees that are major hosts	*plan A* **80**	*plan B* **0**
Planted trees not yet screened (step 3 to do)	*plan A* **220**	*plan B* **300**

What the example shows

1. **Plan A increases an existing problem.** The share of plane trees rises from 12.7% to 13.2%, further exceeding the 10% species limit. In addition, 80 proposed trees are classified as major hosts of a regulated pest.
2. **Plan B improves diversity, but does not resolve every issue.** The proportions of plane trees, maples and the maple family all decrease. However, plane trees still exceed the 10% species limit (11.6%).
3. **Neither plan is ready for implementation.** Pest–host screening remains incomplete for 220 proposed trees in Plan A and all 300 trees in Plan B. These species must be screened before a final decision is made.