

Choosing understorey crops for New Zealand planted forests



A quick framework is presented for choosing the best understorey crops to use in planted forests in New Zealand. While most of these steps seem intuitive and straightforward, completing them requires specialist skills, especially with combining data from: forest management, soils, climate and growth information on the crop itself.

Understorey crops are potentially valuable plant species that can tolerate the shade in planted forests. New Zealand has an estimated area of around 1.7 million ha of planted exotic forest with a typical 25 to 30 year rotation. Selective understorey cropping on arable forestry land can utilise the space under trees to promote earlier financial returns and diversified products until the trees are harvested.



PLANNING CONSIDERATIONS

Careful planning and good research will help to minimise risks and promote efficient land use. The following framework has been developed.

ONE: Identifying potential understory crops and markets.

Although there are a large number of plant species that are able to tolerate a shaded environment, not all will be suited to growing under radiata pine in any particular environment. Reviewing websites, magazines, and consulting with nursery experts will provide information on potential understory crops and markets. Understorey crops should:

- tolerate shade
- be shorter than the trees
- be less susceptible to diseases that affect the trees
- not be invasive or involve damage to the trees
- not compete with the trees for water and nutrients

TWO: Identifying suitable land.

- i) Map the forest area and define age classes of trees to determine suitable areas for understory crops. Forest age classes can be obtained from forest management companies or tree owners. Land areas of interest will contain forest that is aged over 15 years. In New Zealand planted forest management such as pruning and thinning is usually complete by year 15, which allows for a minimum of 10 years of understory cropping on appropriate land.
- ii) Each understory crop species requires a specific set of environmental conditions that determine where it will thrive. Knowing a site's climate, soil and slope will help selecting appropriate suitable understory crop:
 - Climate information can be obtained from local weather stations or from the national climate database (NIWA). Climate data should include average yearly rainfall, minimum and maximum rainfall, temperatures and relative humidity.
 - Broad soil data can be obtained from the national soils maps, or more specifically through the services of a soil consultant. Soil data includes soil type, soil pH, soil drainage and moisture.
 - Slope for cropping land should be less than 15° to allow for machinery access if required.

THREE: Identify specific crops for local environment.

From the list of potential plant species, those that match the local climate and soil conditions can be shortlisted. Consideration will need to be given to any specific level

of shade that an understory crop requires. By taking images with a fish-eye lens, the level of available light in an area can be measured with commercially available software.



FOUR: Consultation with landowners for species preference.

Although research may result in a suitable list of potential plant species for cropping, there may be preference for one crop over another. Landowners need to be aware of what outcomes they are seeking whether it is for economic, environmental, social or cultural purposes.

FIVE: Carry out economic analysis on a short-list of crop species.

To decide whether a crop will be profitable or not, a good understanding of national and international markets is necessary. Landowners need to determine how the crop will be processed and where it can be sold. They need to know the setup, maintenance, harvesting and marketing costs and work out if these exceed the predicted financial returns, before deciding to go ahead with a chosen crop.

Planting trials can be carried out when planning is completed.

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