Teaching Agriculture and Horticulture

NZASE resource

Agriculture is responsible for 80 percent of New Zealand's exports and employs 143,000 people (Statistics NZ). We desperately need more people skilled in this area, and education is a key part of the solution. All schools can teach aspects of this at least to juniors, with support available. NZASE Science Communicator Mike Stone looks at how some schools are teaching agriculture and horticulture and getting students the practical skills needed.

Primary Industry Trade Organisation (PITO)

This Transitional ITO supports schools to teach horticulture and agriculture, with teaching resources, Gateway and a Trades Academy programme.

Schools will need to meet PITO requirements and be approved before they can deliver the Trades Academy, and places are limited. To gain the NZ Certificate in Primary Industry Skills Level 2, students must complete 40 credits over two years from the approved programme, which must include the 10-credit health and safety unit standard.

Making best use of gardens

Anita Taylor and Kate Georgetti teach at Paraparaumu College, on the Kapiti Coast. They are fortunately able to use land and buildings bequeathed to the school by local resident Averil Low, for teaching Horticulture.

Here they make use of the Square Foot Garden (SFG) practice: a raised bed 1.2m^2 is divided into nine square sections (instead of rows), each planted in a different crop, at a density based on plant size. Pests are discouraged by companion planting and crop rotation (once one crop is harvested, a different crop can be planted in the same square within the same season). Adding compost (grown from food tech scraps and prunings) each time a new crop is planted eliminates the need for fertiliser. Regular weeding and watering is needed.

View from Ōmihi, North Canterbury, by Bernard Spragg, public domain.

The Year 9 Horticulture course is based on a home/kitchen garden model. Using pallets, students learn to build and fix raised beds themselves. Using permaculture practices, each group of three students maintains a SFG, deciding the crops they will grow, dependent on the local climate and sun position. Students learn about composting, recycling, and pest management.

The Year 10 course is more about agriscience, with a greater focus on primary industry than hobby gardening. Students compare permaculture in home gardens to large-scale sustainable agriculture to prepare them for work in the food and fibre sector. These students are introduced to growing natives and participate in grow Waikanae Estuary Care group plantings. At both levels, students share their lesson time between the classroom and the garden, linking theory to practice.

Although kai is shared in the class or with whānau, juniors know they can't just help themselves, as weighing the harvest may form part of a senior assessment. "So this food is not

St Paul's Collegiate students in the garden. Photo: Kerry Allen.

yours, it is ours; kai is shared and we harvest as a group," says Kate. And at the end of the year students take a crop to the foodbank.

The school has many facilities on this donated land: the SFG gardens, a greenhouse and a shade house that all students use. The crops in the orchards, perennial garden and annual garden are run by senior students. At L2 students may take an ITO Horticulture practical course with beekeeping, canopy maintenance, raising seeds and cuttings, or an Agriscience academic course incorporating Livestock and Crop Management, and Environmental Standards. All the hardscape is also maintained by students from Year 11 up – water-blasting, painting, fencing – learning the seasonal maintenance of a nursery, not just the Horticulture. Anita says the ITO Trades Academy has really helped maintain the grounds as "we incentivise weeding and maintenance with credits, assessing the standard over the whole year."

The school is starting to use a tuakana/teina model at times, where senior students show younger ones. The senior student demonstrates understanding by teaching the skill, while the younger ones learn a new skill and do some work for the senior crop.

These students are also learning communication, teamwork and problem solving. "This is an amazing experience for students; they are learning skills for life. The biggest thing we do here is grow the kids. They learn skills and value systems useful to others," say Kate and Anita.

A school farm

Raechel Milich is acting HoD for the Agriculture courses at Mt Albert Grammar School (MAGS), in Auckland. The school is fortunate to have its own eight-hectare farm, established in 1932 and rented from the ASB Charitable Trust for minimal charge. A new building programme is underway, rejuvenating both the teaching spaces and the farm facilities. The farm manager has lived on-site for many years and helps the students develop practical farm skills.

MAGS students learning about wool, and to drive all-terrain vehicles. Photos: Raechel Milich.

At all levels students learn about plants and animals and their environmental impact. The land also includes an orchard and greenhouse, as well as gardens. In the greenhouse, students plant seedlings including natives for local tree planting groups and for Trees For Survival. Their gardens are currently planted in potatoes and kūmara (the Owairaka variety, which originated locally). As well as seasonal vegetables, students also grow herbs and edible flowers for the food and hospitality departments.

Students learn about breeds of sheep and cattle, their purposes and the diseases they may get. They learn how to dag and shear sheep, feed and milk calves, and care for pigs, chickens and bees. With one farmer and few animals the tasks need to be carefully managed – the same process, e.g. shearing, may be repeated on different days. The cows are milked once a day at 9am.

Students learn about environmental impact at garden and farm levels, strategies that help us grow our food sustainably. Seniors are assessed in two ways. One pathway is through industry unit standards, a hands-on approach aimed at those students who wish to be directly involved in managing and owning their own farm. The other pathway is through NCEA achievement standards, aimed at those who want jobs in allied roles, such as genetic development, veterinary services, and environmental monitoring.

Year 11-13 students' learning includes practical aspects of health and safety, handling livestock, managing grazing, fencing, and using tractors, bikes and all-terrain vehicles.

MAGS students learning about wool classing. Photo: Raechel Milich.

Mātauranga Māori

Cassandra Wilberforce, HoF at Flaxmere College (FC), teaches and assesses Level 2 students using Te Whakamahi Whenua resources from PITO. She says, “86 percent of our students are Māori, and teaching this mātauranga fits well with our kaupapa.”

The first unit looks at knowledge of te whānau mārama, the moon, sun, stars, constellations and planets related to growing our food. “Matariki is a major event for us,” says Cassandra. “From Year 7 students spend a week learning about all things to do with this celebration, so they already know a lot when they get to Year 12”.

In this unit students learn about using the stars of Matariki to predict crops, using the lunar calendar for fishing and gardening, karakia and crop rotation. This learning is assessed with US 15980 (each of these assessments are worth two credits).

Then students explore traditional insecticides and fungicides. This includes uses of horopito, burning kauri gum on māra for kūmara, and uses of companion plants (Cassandra includes marigolds and garlic). Aspects of rongoā are relevant here. As well as PITO resources, a Science Learning Hub video about the taewa potato was useful. This learning is assessed with US 15975.

Students also study crop propagation in accordance with local tikanga. FC is still establishing gardens; they have 10 raised beds and a greenhouse and are putting in hydroponics.

Cassandra explains “I ask students about ancestral seeds in their whānau, and the whakapapa behind that, showing the importance of genetics.” She takes students into the food tech room so they can cook up their crops. This learning is assessed with US 25469.

The school helps Level 2 students find placements in orchards, meat-works, market gardens and farms. Students who go to the family farm in the holidays are encouraged to keep a journal.

Cassandra finds the teaching resources provided by PITO very useful for these standards.

The school has a fledgling relationship with local iwi – “we are working on it,” says Cassandra. “The students will do a fencing course and we will approach the marae to see if they want a new fence.”

This course is funded through PITO, who provide packs of clothes for fishing and hunting (pants, socks, tops), while the school provides gumboots and shoes. This subject teaches students basic life skills – how to use a hammer, snippers, weed-eaters, lawn mowers and how to look after these tools.

Using community connections

Waiheke High School (WHS) has offered L2 and L3 courses on viticulture for more than 15 years, originally at Goldies Vineyard and then Cable Bay for more than 10 years. HoF Katherine Cole explains how the Science department makes use of its strong community connections. Students learn:

- How to plant, prune, weed, harvest grapes and keep a work record at Owhanake Bay Estate, Stoneyridge and Mawhitipana Ridge Estate vineyards.
- Health and safety, crop health and pruning at Nourish Gardens, a flower farm owned by an ex-staff member.
- How to sow seeds, plant out seedlings and remove weeds at the school grounds and Piritahi marae.

WHS students at Nourish Gardens. Photo: Tanique Deacon.

Dean Henwood, teaching a WHS student cane pruning at Mawhitipana Ridge Estate.

Other work with Love My Wetlands is being investigated.

As well, the school has its own garden, growing vegetables and grapes, protected by a rabbit-proof fence. Here students learn the skills of sowing seeds, planting out, making compost, pruning, weeding and keeping a work record, as well as knowledge of grape-vine physiology.

These students learn about traditional composting and alternatives. The Education for Sustainability group in the school has found money from the BoT, grants and fund-raising to buy a carbon cycle composter for the school.

The Trades Academy includes work at the flower farm in L2, whereas L3 is much more vine-focussed. Next year L2 students will also research the profitability of wine.

Tanique Deacon describes how the school uses Trade Academy funding and resourcing. PITO standards are assessed by PITO assessors and business experts as well as the classroom teacher. The verification process involves the teachers and the sector experts working together in assessment, supported by moderation meetings and best practice zooms.

HATA

All of these teachers find the Horticulture and Agriculture Teachers' Association (HATA) an invaluable support. As well as online resources and advice available for members, they offer a biennial conference.

Suzie Newman is available as an Agricultural and Horticultural Science advisor; email s.newman@stpauls.school.nz, or phone 027 275 6620. She will offer PLD for pre-service or in-service teachers, which will allow teachers of other subjects to add Ag/Hort to their skills kete.

Above: Andrea Adams from PITO, right, with Ohu Unga, a former WHS student who is now working at Casita Miro Vineyard. Photo: PITO.

Below: A WHS student during Cable Bay harvest. Photo: Anton Forde.

Ngā Kupu

Ahumāra – Horticulture
Ahuwhenua – Agriculture
Kaupapa – Strategy, purpose
Māra – Garden, cultivation
Mātauranga momo whakaheke – Genetics
Patu hekaheka – Fungicide
Patu pepeke - Insecticide
Rongoā – Remedy, medicine; to treat
Te whānau mārama – Heavenly bodies
Whakamakuru tipu – Plant propagation
Whakatupu ā-wai – Hydroponics.

From *Te Aka Maori Dictionary*