CHEFS EXPLORE FLAVOUR SAVIOUR

WA’s most highly qualified chefs are tinkering with lupins to ensure they do not appeal to green peach or cowpea aphids, but remain palatable to farmed livestock.

Researchers collaborating through the University of WA based Centre for Legumes in Mediterranean Agriculture (CLIMA) have revealed the key ingredients which make some lupins toxic to aphids and therefore protected from damaging attacks.

Shao Fang Wang of the WA Chemistry Centre and James Ridsdill-Smith of CSIRO examined resistant and susceptible varieties of WA’s popular narrow-leafed lupin and the potentially valuable yellow lupin to detect differences in chemical make-up.

“We found specific alkaloids were 10 to 30 times more prevalent in resistant varieties than in susceptible ones.

“In high concentrations those same alkaloids are toxic to animals, so breeders must strike a delicate balance to achieve aphid resistance, while maintaining palatability and safety for animals,” Dr Wang said.

The high protein content and low cost of lupins have driven annual national stockfeed demand for the grain towards one million tonnes. WA is a key supplier to this market, with production recovering after recent droughts lowered its 1 mt/yr harvest average.

Having identified lupanine as the most active alkaloid contributing to the resistance of narrow-leafed lupin and gramine as the key to yellow lupin resistance, the CLIMA researchers fed low concentrations of those compounds to aphids. The resultant mortality and restricted growth of aphids confirmed the alkaloids’ effect.

“Department of Agriculture trials concluded that lupins became susceptible to aphids when lupanine or gramine concentrations dipped. There were six times more aphids on susceptible yellow lupin and three times more on susceptible narrow-leafed lupins,” Dr Wang said.

Aphid susceptibility has plagued yellow lupins, limiting cultivation of the species which, with its high sulphur and low phosphorus concentrations, could fetch premiums from animal feed markets, such as pigs and aquaculture.
While the experimental variety used in these Grains Research and Development Corporation and Grain Research Committee supported trials proved resistant, its gramine concentration was too high for stockfeed.

CLIMA researchers will investigate the manipulation of alkaloid occurrence to cause greater expression in the phloem eaten by aphids and less in the grain that is fed to animals.

“Getting the right mix of these alkaloids to deter aphids, while appealing to animals, will be a precise science,” Dr Wang concluded.

“We hope to start advising on alkaloid benchmarks to the Department of Agriculture lupin breeding team by the end of the year.”

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