

## Combining yield with persistence –Pegasis, a new generation winter-active and persistent lucerne variety

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**Abstract.** *Increasing demand for widely adaptable pasture legumes such as lucerne as a feed source for the expanding livestock industry in Australia needs lucerne varieties with new combinations of traits. Pegasis, a new generation of lucerne variety (released by NSW Department of Primary Industries), combines high winter production with persistence under dry-land conditions to meet demands for feed.*

### Introduction

Demand from Asia for red meat is increasing and livestock production capacity in Australia is expanding, thereby imposing much greater need for livestock feed. The need for more feed sources and increased conserved feed requirement is expected to drive the need for widely adaptable pasture legumes such as lucerne.

In Australia, the majority of lucerne (3.3 million ha) is grown under dry-land conditions for livestock grazing and opportunistic hay-cutting. Only about 200,000 ha of lucerne are grown under irrigated conditions for hay and silage. New South Wales (NSW) has the largest dry-land lucerne area in Australia estimated to be 2.5 million ha. The area sown to lucerne in the temperate/subtropical wheat/sheep belt in Australia is projected to expand to 7 million hectares in Australia (Robertson 2006).

Expansion of the area sown to lucerne under irrigation is limited in Australia as water supply is decreasing and review of water allocation by the federal government could lead to additional cutbacks. In general, use of water for irrigation of hay and pasture has been declining annually in Australia (Trewin 2006) and water is being re-allocated to higher value crops such as horticulture (Lindsay 2001). Therefore, it is expected that the majority of the agricultural expansion in Australia will occur under dry-land conditions. Varieties with new combinations of traits such as high yield with long term productivity due to persistence will enable such an expansion.

Currently, out of 65 lucerne varieties marketed in Australia, the majority (35) are high winter-active types with dormancy classes 8–10, mostly catering for short term rotations (2–3 years) and irrigated systems. These varieties have the advantage of high growth rate for about two years after establishment and provide several cuts under irrigated conditions. However, highly winter-

active varieties generally lack persistence, predominantly due to exposed crowns which are damaged by grazing livestock (especially sheep). This limits their capability of exploiting their potential for high yield under dry-land conditions. New generation varieties combining high yield with persistence is highly desired by lucerne growers. Pegasis, a new generation variety released by NSW Department of Primary Industries (DPI), combines high yield with several desirable traits such as persistence, buried crown and branched stem growth habit.

### Methods

#### Breeding and origins of Pegasis

Pegasis is a synthetic variety developed using recurrent phenotypic selection for productivity, winter-activity, persistence and pest and disease resistance within a population based on CUF 101. Two distinct experimental populations were initially created. Population CufC1 was derived by hand crossing 51 CUF 101 plants selected for productivity, plant type and resistance to leaf disease. Half-sib progeny were selected from two cycles of recurrent selection for yield, leaf disease, resistance to spotted alfalfa aphids, blue green aphids and anthracnose. Population C3 was created by crossing original CUF 101 plants to spotted alfalfa aphid resistant selections from WL514. Half-sib progeny from CufC1 and C3 reselections were crossed to form CufC1TPx. Plants from CufC1 and CufC1TPx were poly-crossed to form a bulk population Y8602 which was evaluated for productivity and persistence in multi-year multi-environment trials (MET) for nine years. The best survivors selected from Y8602 were open pollinated and seed bulked to form Y9519 which was further evaluated under MET conditions for three years. Y9519 had outstanding forage yields and persistence and was released as Pegasis in 2006.

## Results and discussion

### Growth habit

Pegasis is highly winter-active, however, not as winter-active as cultivar Rippa and other extremely active types such as cultivar SARDI Ten. Unlike these latter cultivars, plants of Pegasis are very leafy and densely branched with relatively large spreading crowns. Pegasis has much better survival under dry-land conditions compared to other winter-active types. Flower colour is predominantly purple to mauve, with a low proportion of plants with dark purple, lilac or variegated flowers.

### Pest and disease resistance

Pegasis is highly resistant to spotted alfalfa aphid (SAA), with more than half of all seedlings surviving severe infestation by SAA under controlled conditions in the greenhouse. Across the two tests conducted, Pegasis was comparable to the successful NSW DPI cultivar Aurora. The level of blue green aphid resistance in Pegasis is adequate to prevent problems in the field. Greenhouse tests have shown that it has very robust resistance to phytophthora root rot compared to all but the highly resistant cultivar Aquarius. The anthracnose resistance of Pegasis is comparable to that of the other cultivars released from the NSW DPI program, but less than that of cultivar Sequel HR and other highly resistant cultivars.

### Seed production

Large scale commercial seed production has shown Pegasis to be capable of yielding more than 1 t/ha seed yield when optimum irrigation management practices for seed production are implemented.

## Conclusions

Pegasis is mainly suited for use in short term rotations (3–4 years). It is dormancy class 9 and is bred for production and persistence under dry-land cropping rotations. Its multiple pest and disease resistance allows it to be grown in a wide area of Australia.

## Acknowledgements

The development of Pegasis was partially supported by the Grains Research and Development Corporation.

## References

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