

A review of the potential of *Lathyrus sativus* L. and *L. cicera* L. grain for use as animal feed.

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Full article published in *Animal Feed Science and Technology* (2000) 87, 1-27.

Summary

The use of the two closely related species, *Lathyrus cicera* and *L. sativus*, as grain legumes for human and animal consumption, dates to the Neolithic period. Due to its tolerance to harsh environmental conditions *L. sativus* is still used widely for human food in Ethiopia and the Indian sub-continent. Cultivation has decreased in many other regions.

The grain of both *L. cicera* and *L. sativus* contains the neurotoxin, 3-(-N-oxaly)-L-2,3-diamino propionic acid (ODAP), which can cause a paralysis of the lower limbs known as "lathyrism". Due to the occurrence of lathyrism in humans recent plant breeding has been concentrated on producing cultivars with low ODAP concentrations in the seed. The susceptibility of animal species to lathyrism is poorly understood, although horses and young animals are often noted as more susceptible. Older published animal feeding studies are of limited use, since the presence and role of ODAP was unknown until the 1960's. More recent feeding studies indicate that low ODAP lines of *L. cicera* or *L. sativus* can be safely incorporated at inclusion rates up to 40%, 30% and 70% of the diet of poultry, pigs and sheep, respectively, without growth reductions.

The compositions of both *L. cicera* and *L. sativus* are similar to those of other commonly used feed grain legumes, respective protein contents being 30 and 29% (DM basis) and are compared over a large number of studies in Table 1. Antinutritional factors (ANFs), other than ODAP, are present in both *L. cicera* and *L. sativus* at concentrations similar to those found in other grain legumes; and include trypsin inhibitors, chymotrypsin inhibitors, amylase inhibitors, lectins, tannins, phytate and oligosaccharides. The effect of ANFs in *L. cicera* and *L. sativus* on animal performance is not well understood and is sometimes confounded with ODAP effects. Heating of grain will reduce levels of the proteinaceous ANFs and in some cases ODAP as well.

Table 1: Composition of *Lathyrus sativus* and *L. cicera* in comparison to field pea (*Pisum sativum*) and faba bean (*Vicia faba*).

Component (% DM)	Species			
	<i>L. sativus</i>	<i>L. cicera</i>	Field pea	Faba bean
Protein	29.4	29.6	25.7	26.9
Ash	2.6	3.5	2.8	3.0
Fat	1.6	1.1	1.2	1.4
Crude fibre	8.0	7.0	6.6	9.4
Acid detergent fibre (ADF)	9.3	10.7	10.3	11.0
Neutral detergent fibre (NDF)	15.6	19.4	14.7	14.3
Lignin	1.2	0.4	0.6	-
Starch	41.2	44.2	45.3	40.0

Variation recorded in the germplasm of *L. cicera* and *L. sativus* has not been greatly utilised in plant breeding to lower levels of ANFs, with the exception of ODAP, leaving considerable potential for rapid improvement of cultivars. *Lathyrus cicera* and *L. sativus* are low production cost legumes adapted to low rainfall environments and have considerable

potential as good quality, cheap protein sources. As world demand (particularly in Asia) for legume feed protein is likely to increase, due to increasing demand for animal food products, both *L. cicera* and *L. sativus* are crops that should be considered in regions with suitable environments.