Onobrychis viciifolia Scop.
(syn. *O. sativa* Lam.)

Sainfoin

A STUDY OF GROWTH AND MANAGEMENT OF SAINFOIN (*Onobrychis viciifolia* Scop.)

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JAMES ALAN FORTUNE
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ABSTRACT

This thesis reports on studies designed to examine the production patterns of sainfoin (Onobrychis viciifolia Scop.) subject to defoliation. Dry matter yield estimates, seasonal distribution of production, plant disease and long term survival were considered for three sainfoin cultivars in a field trial run over a three year period. Assimilate partitioning and closer examination of plant morphology was studied using two of the cultivars grown under controlled environment conditions.

Sainfoin was successfully established in the spring period and early growth rates and dry matter production were at least as good as those of lucerne. All cultivars grown showed a tendency towards relatively early flowering when compared to lucerne. Only Fakir, the earliest flowering of the three cultivars, regrew sufficiently to be harvested a second time under the conservative harvesting regime imposed to maximise uninterupted growth during the establishment year. The results of the two different cutting heights provided little evidence to support the higher of the two cuts (12-15cm). The main outcome was to leave about 25% of the dry matter behind as stem with little gain in residual leaf area to provide a photosynthetic surface for regrowth.

Subsequent growth and regrowth cycles in the field gave yields of up to 12 t/ha of herbage dry matter in a single season. All cultivar and management combinations tended to show poor autumn growth, with the plant adopting a rosette habit when lucerne was still actively growing. Also while the cultivar and management combinations gave a variable number of harvests in a given season, there was no evidence to support any one

management approach as being superior in production. The later maturing cultivar Melrose did provide some indication that higher yields may be possible from a later maturing plant, but also provided evidence of the potential for marked leaf loss when the plant was maturing under drying conditions. Leaf loss aggravated the situation of low leaf area indices that was shown for all three sainfoin cultivars.

Plant losses in the field trial resulted in uneven stands and contributed to the sampling variability which reduced the sensitivity of the experiment. While some of the losses were possibly related to the plants consistently harvested at a vegetative stage, all sainfoin plants were susceptible to a crown-root rot complex. This was indicated by necrosis of the crown tissue and vascular tissue of the tap-root which was often extensive and extending well below ground level.

Controlled environment studies provided further evidence of the poor regrowth ability displayed in the field. This would appear to be a result of a combination of the poor development of any new shoots to provide a start point for regrowth, little leaf area remaining at the base of the plant after harvest to provide a photosynthetic surface, and losses of root and nodule tissue from the plant after the stress of harvest. This tissue was subsequently replaced, possibly at the expense of top growth. Movement of assimilates to the root system did not tend to support any hypothesis of a build-up phase which may have interacted with management.

Indication of the within-cultivar variation for sainfoin was clearly shown under the controlled environment conditions. Multivariate analysis of the data provided a preliminary estimate of the gains that might be

possible if certain groups of attributes formed the base of a selection programme. Future prospects for sainfoin in grassland farming were proposed in the light of this information, and that gained from the field trial. These focused on the need to more fully evaluate sainfoin as a species, or group of species, and establish its demands rather than assume it will conform to the management model provided by other summer active forage crops.

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