Bul. Agron. (31) (1) 31 – 36 (2003)

Nitrogen Transfer of Two Cultivar Faba Bean (*Vicia faba* L.) to Oat (*Avena sativa* L.)

H. Purnamawati[1)], K. Schmidtke [2)]

ABSTRACT

Nitrogen fixed by the legume could be used by other plants, such as through rhizodeposition and direct transfer between roots. The possibility of N transfer in intercropping legum-cereal have long been observed, especially legum with short and dense root. This experiment had been carried out to determine whether there was N transfer from faba bean (Vicia faba L.) growing in association with oat (Avena sativa L.) and whether there was difference between two cultivars of faba bean in the amount of N transfer. Methods used were complete-mixed-root (CMR) between faba bean and oat, and mixed half the root of faba bean with oat (SR). As a tracer isotope ^{15}N was used in form of $K^{15}NO_3$. The experiment was carried out from May 2000 through January 2001 in Institute of Agronomy and Plant Breeding, University of Goettingen Germany. The data of CMR method had great variance. Using SR method a positive value of ^{15}N enrichment was found in oat indicated that transfer N from faba bean cv. Minica and Scirocco occurred. There was no difference found in the amount of N transferred between the two tested cultivars.

Key words: N transfer, ^{15}N, Faba bean, Oat

INTRODUCTION

Because of the ability of legumes to fix N_2 from atmosphere through their symbiosis with *Rhizobium* bacteria, legume crops are often included in intercropping systems. Giller and Wilson (1991) described mechanisms by which legume nitrogen can be made available to other plants, included rhizodeposition, root and nodule senescence, and direct transfer of N between roots. Nitrogen transfer from legume to cereal might have the potential for further manipulation to increase cereal yields (Vandermeer, 1989).

Addition yield from mixtures of non legumes and faba beans compared to mean yield of sole crops are often to be found (Jensen, 1986; Bulson *et al.*, 1997; Li *et al.*, 1999). Li *et al.* (1999) suggested that the beneficial effect of faba bean/maize mixtures was the results of transfer of substances from faba bean to maize via roots. In the field studies neither Danso *et al.* (1987), who used the ^{15}N dilution method, nor Cochran and Schlentner (1995), who using N difference method, found an evidence of N transfer from faba bean to cereals. The roots of faba bean are relatively large and sparse so that sloughing of legume roots is not provided. On the other hand, N transfer to non-legume could be proved for numerous grain legumes such as pea (Jensen, 1996) and soybean (Van Kessel *et al.*, 1985; Martin *et al.*, 1991; Hamel *et al.*, 1991).

The proportion of N, which transferred from legume to non-legume plants, depends on the ability of N_2 fixation by the legume (Ta and Faris, 1987) and the growing condition of the legume (Giller and Wilson, 1991). Since species or cultivar of legume plants, which have different growth habit, may have a different capacity to fix N, it is likely that the proportion of N transfer could be also different between species and cultivars.

Faba bean is a wildly cultivated grain legume, it occupies nearly 2.3 x 10^6ha world-wide (FAO, 2000). There is a lack of information on N transfer and the difference of N transfer from different cultivars of faba bean. Therefore, the following experiment had been carried out with the aim: to determine whether there was N transfer from faba bean, to measure the proportion of N transferred from faba bean to companion plant oat (*Avena sativa* L) and to examine whether there are differences between cultivars of faba bean in the amount of N transfer.

[1)] Departemen of Agronomy, Faculty of Agriculture, Bogor Agricultural University. Jl Meranti Kampus IPB Darmaga, Bogor, Indonesia. Ph./Fax:0062-0251-629353

[2)] Institut of Plant Production and Plant Breeding, University of Goettingen. Von Siebold Str 8, 37075 Goettingen, Germany