

Abstract 514-43.10/02OE318

Nitrogen supply of vegetable and maize crops following winter green manure legumes

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The N supply of legumes grown as winter green manure crops was investigated (hairy vetch, crimson clover, mixtures of hairy vetch with grass or rye). Pure stands of turnip rape, rye, grass and fallow were used as reference crops. The green manure crops were tested at three organically farmed locations in the lower Rhineland region in field plot trials in the years 2002 and 2003. Yield (2.1 - 6.2 t DM/ha), N-uptake (65 - 200 kg N/ha) and net-N-fixation (in average 100 kg N/ha) were determined. The green manure was mulched or harvested in May/June. The increase in N mineralised in the topsoil was measured the first weeks after ploughing the green manure crop and seeding of the following crop and reached up to 50 - 180 kg N_{min}-N/ha, which correlated well with the assessed mineralisation based on the N-content, CN-ratio, lignin-content and lignin-N-ratio.

Yield and N-uptake of the following crops were 877 - 1274 dt FM/ha and 125 - 230 kg N/ha for white cabbage and 138 - 196 dt DM/ha and 150 - 280 kg N/ha for maize used for total plant silage. A cob yield between 76 - 130 dt DM/ha and a grain portion of the cob of 77 - 89% were measured. The N-uptake of the following crop was higher after the mulched treatment compared with the harvested green manure treatments. Nevertheless, the differences in N supply between these two treatments were not recovered in the same amount in the shoots of cabbage and maize. The soil-N-source partly overlapped the green manure-N-source impact. But by mulching instead of harvesting the green manure the N- and humus budget were balanced. Winter green manure crops can provide an essential N source of innerfarm N input. Based on the research results an extended list of recommendations is presented.