Practical use of cover crops

Leguminous cover crops are gaining a growing interest among farmers, extension workers and researchers in Central America. The benefits of these crops are well known at present, although their exact performance varies with species and depends on growth conditions as well.

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In countries where fertiliser price may rise by 50% per year, the use of nitrogen fixing legumes is of tremendous importance for poor farmers. Additional positive effects on soil structure (eg water retention, aeration) also become more important when farm management reaches a higher level. It is often claimed to suppress weeds, a problem in plant production that demands large amounts of labour to overcome. Assumingly, green manure crops are ideally grown during the fallow period so that the following crop can have full advantage of the N-fixation and the improvement of soil structure. In circumstances of high land pressure this is often not possible, so solutions are sought in growing it simultaneously with the main crop.

Velvet bean

Thus, in Honduras velvet bean (*Mucuna pruriens*) is reported to contribute some 60 kg N/ha. An experiment in Bolivia even yielded 15 tons of green matter. Brazilian leading researchers achieved maize yields of up to 6.800 kg/ha without any other external N-input but from the velvet bean. Farmers prefer to plant the velvet some two weeks later than the main crop, often maize. This enables the maize to establish itself before the prolific growth of the velvet sets off. The velvet crop produces large amounts of seeds that farmers often do not harvest. They prefer to let the crop regrow spontaneously the second year. In that case the rapid growth of the velvet can easily smother the crop so weeding is necessary. However, if one wants to take advantage of new cover, the velvet has to be established again. Either one leaves during weeding some 1-2 plants per square metre or one takes out all velvet plants and plants anew. Velvet is also used when two crops are grown in one growing season. Basic element in all velvet bean management is that the velvet does not overgrow the standing crop.

Weed control

Trials by the International Institute of Tropical Agriculture in South-Benin have shown that *M. pruriens* var. utilis is able to effectively control the spread of the weed grass *Imperata cylindrica*. First the Imperata is slashed, then the velvet bean is sown at a spacing of 80x80 cm (some 15,000 plants per ha, about 15 kg of seed) with one seed per pocket. Imperata shoots that reproduce immediately after germination of the velvet bean, should be slashed after three weeks when the velvet seedlings have 3-4 leaves. Although the Imperata will continue to reproduce new shoots, the velvet bean will use them as support to quickly develop a dense canopy. The Imperata leaves, devoid from light, start to exhaust their own root system for respiration purposes. Early planting in the first season proved to be more successful. During the dry season the velvet bean dies off. The next year preferably a fast growing tall crop should be planted directly into the mulch without burning the velvet cover. This limits regrowth of both Imperata and velvet. Consequent hand-weeding is needed but does not seem to be an additional labour burden for the farmers as it coincides with normal field preparations and first weeding in the respective crop.

Runner bean

This climbing legume (*Phaseolus coccineus*) is extensively cultivated as a food crop in Central America at high altitudes (1,400 - 2,000 m) and with sufficient rainfall. Its origin has been traced to the highlands of Mexico. It is almost exclusively intercropped with maize. Its growth cycle exactly coincides with that of maize. The food value will make it difficult to promote runner bean as a pure green manure crop because farmers do not like to deny themselves a bean harvest by ploughing under the crop in its immature green state. However, the crop performs as such due to its N-fixation, soil cover, and production of biomass that can be recycled after harvest. The latter is especially important in the more humid areas where nutrients can be better stored in the vegetation than in the soil. Farmers surely appreciate its resistance to common pests such as leafhoppers (*Empoasca spp.*), flee beetles (*Epitrix spp.*), and cutworms (*Felta subterranea*), that damage common bean (*Phaseolus vulgaris*) much more heavily. This may explain why in recent years the price of runner bean has rised steadily.

How to grow

Runner bean is planted by farmers in two different systems. In the first system the beans are planted in plants holes 1.5 metre apart (4444 plants per ha). Two to three maize seeds are planted in holes 1 metre apart. In the other system maize is planted in rows (1.2x0.35 m) with two seeds per hole. Runner bean is simultaneously planted by putting one seed in every third hole in the row and every other row of maize. It produces a tuberous root that can survive for 4 years. Every year it sprouts from the root that does not withstand light. Therefore, farmers growing runner beans either plough with extreme care or do not plough but plant maize with the traditional stick known as 'barreta'.

Performance

Some agronomists indicate low yields but farmers with extensive experience are of a different opinion. Yields appear to be proportional to the planting density. Moreover, once the tuberous root has established, the crop produces more each year. Runner bean's potential for sustainable agricultural development has been largely overlooked by scientists. Therefore, we need to gather more information about its performance under practical conditions such as planting densities, biomass production, effects on weed growth, yields, N-fixation and nodulation, or field management. Close contact with farmers is a prerequisite to bring out realistic limitations and opportunities. Farmers should also be involved in experimental research. ■

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