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Reduction of overgrazing pressure on rangelands by grazing annual medics

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RESUME – *"Réduction de la pression du surpâturage sur les parcours en utilisant des Medicago annuelles comme source de fourrage". L'Iran, sur une surface totale de 164 millions d'hectares, possède environ 90 millions d'ha de parcours, et 12 millions d'ha cultivés en sec. Les parcours subissent deux problèmes : une intensité croissante de pâturage et la destruction des parcours par mise en culture de ces terres. Il existe actuellement 124 millions d'équivalent bétail (équivalent ovins). Parmi eux, 83 millions vivent des parcours et des résidus des cultures. Pour assurer un niveau satisfaisant de nutrition, 41,7 millions de tonnes de matière sèche sont nécessaires annuellement pour les 83 millions d'unités de bétail (Dept. of Range, 2001). Il y a un déficit alimentaire d'au moins 31 millions de tonnes, qui est actuellement comblé en broutant les plantes des parcours au-dessus de leur capacité actuelle de pâturage. En résumé, la situation est critique, et de nouvelles stratégies doivent être adoptées pour s'assurer que, sur les 12 millions d'hectares plantés en céréales, au moins 10 millions d'ha soient destinés aux Medicago en se basant sur le système de "ley farming". Les Medicago cultivées en sec sont l'une des stratégies évidentes permettant un bénéfice très immédiat.*

Mots-clés : *Medicago annuelles, céréales, parcours, bétail, système de rotation.*

Introduction

This paper discusses briefly the potential of medic based ley farming system within Iran with the purpose of reducing the harmful effects of overgrazing on rangelands. Constraints and recommendations for implementing the system by using self-reseeding annual forage legumes and other related matters will be mentioned as well.

Background

The annual area sown under rain fed cereals in Iran is about 6 million hectares. 1.58 million ha with barley and 4.42 million ha with wheat. More than 6 million hectares are left as fallow each year. Despite the great importance of these two crops, the yields are very low and average 0.56 t/ha. The present production of 6.2 million tons of wheat and 1.7 million tons of barley (rain fed and irrigated) is inadequate to meet the entire food and feed requirements of more than 60 million persons and the correspondent animal population.

Rangelands are a very important national resource of Iran: they cover 90 millions of the 164 million hectares of Iran. As the population increased, the demand for animal meat and grain increased proportionally and rangelands suffered in two ways: increased grazing intensity and destruction of rangeland pastures by cultivation for crops. Currently, cultivation under rainfall regimes of 200 mm or less and on steep and stony soils is having a severe impact on rangeland condition. Only 10% of these rangelands present reasonable condition and production level (Table 1). Marginal rangelands produce only around 118 kg/ha/year (Dept. of Range) and their poor nutrition level affects animal performance. Both growth rate and lambing ratio are is reduced whilst mortality rate is increased.

Table 1. Rangeland condition of Iran, 2001 (Dept of Range)

Class	Condition	Area (Million hectares)	%
A	Fair to good	9.3	10.33
B	Fair to poor	37.3	41.45
C	Poor to very poor	43.4	48.22
total	-	90	100

Strategies to reduce overgrazing pressures

It might be argued that a major reduction of one third in wheat lands or livestock number is the obvious solution. But this proposal is not realistic, because it will decrease the already low income of the villagers, create more poverty and accelerate migration to the cities. Therefore other approaches should be taken under consideration, and priority must be given: i) to ensure that, 10 of the 12 million hectares cropped to cereals, will be shifted to ley farming; and ii) to convert 2 million hectares of high elevation rangelands into pastures by sowing lucerne or other perennial forage legumes.

Medic pastures in dryland farming regions

Iran has at least 12 million hectares of cropped land from which 6 million are dedicated to fallow each year (Ministry of Ag., 1990). After the lucerne sowings, the balance of 10 million hectares might be used for ley farming of medic pastures in rotation with wheat or barley.

Annual medics are likely to be the preferred legume for the ley farming system because they occur naturally in all regions, are well adapted to alkaline soils, and especially suited to rotation with cereals because of their inherently high hard seed content. Hard seed, which in some varieties may amount to 90 per cent at the beginning of the crop phase, allows the species to carry through the crop and successfully regenerate in the following years (Taylor and Ewing, 1987).

Application of ley farming system has been introduced to the Iranian farmers / livestock owners by the Department of Range in 1984. The regions most suited to medics throughout the country were chosen by the Range Department of the Forestry and Range Organisation of Iran. They are characterised by alkaline soils, moderate topography, low altitude (less than 1000 meters) and reliable rainfall (250 mm plus). In these regions, since commencement of implementation of the ley farming system, 73,086 hectares, according to the provincial offices reports, have been sown with annual medics such as *Medicago scutellata* cv. Robinson or Sava, *M. truncatula* cv. Jemalong and *M. littoralis* cv. Harbinger.

According to site conditions, yields varied from 900 to 2800 kgDM/ha/year and even in some special and rare cases it was up to 6900 kg. In overall, the average usable yield was 1500 kg DM/ha/year (Dept of Range, 1990).

Constraints

In the current situation there are some constraints which face the implementation and development of the ley farming system in Iran . They could be categorised as follow.

Socio-economic constraints

At the time of introducing the ley farming system to the Iranian farmers / livestock owners, some of the district government agencies gave them some materials such as: seed, fertiliser and technical advises and support either free or half price ; and purchased their produced seeds at a good price for a period of 2-3 years to encourage them to apply the system. But, unfortunately, when the government reduced or cut the support, the farmers stop the system in most cases.

One of the social attitude of the Iranian farmers is their concept of livestock raising. They buy livestock, without predicting the reliable source of feeding for their animals, whenever they come into an appreciable amount of money, as when they harvest a good crop. Farmers or livestock owners feel that the more livestock they own the more security they have. Therefore when the question of de-stocking is asked, they will not, in most cases, accept the argument that fewer means better fed animals and will provide the same revenue and security. Such a change in attitude from the farmer's part would take time and a lot of effort.

When the ley farming is first brought to the farmers attention, they are often interested and excited by the prospect of producing more animal feed. However, their tendency to graze every bit of pasture as soon as it grows, destroys any possibility of adequate seed production for regeneration. Seed

production and survival of medics, is almost non-existent under overgrazing. Therefore grazing management of newly established pastures would face strong difficulties.

Technical constraints

Due to the small size of the farms, farmers do not always own the required machinery suitable for medic seeds. Most call upon other farmers or government institutions to rent tractors with ploughs, seed drills, hay making equipment and so forth. Also small sized farms with rough and uneven surface makes it difficult to harvest seeds by using vacuum combines.

Lack of a sound management of the medic pastures is one of another major constraints to the adoption of the ley farming system. Farmers, even when they own the grazing livestock, have been able to adjust the stocking rate to plant growth and development. Trespassing by neighbours is common and also increase overgrazing.

The bio-environmental constraints

Since, the big portion, 80%, of the dry-land farming areas in Iran are located on the high countries and cold regions, therefore the most important constraints in this regard is the lack of cold tolerant seeds in medic cultivars available in commercial quantities.

Technological constraints

Unfortunately, sufficient attention and long-term research were not devoted to the expansion and development of the ley farming system in Iran and that is why the system did not fare well. Much more needs to be done to study the system and make it fit the farming conditions and existing practices in the region. Development of native plant material and on-farm research / demonstrations would be a sure way of securing the necessary farmer / scientist interactions.

Conclusions and recommendations

On the basis of the results gained from the above-mentioned experiences developed from 1984 to 1990), the estimated *5* million hectares of medic pasture will produce a total of 7.5 million tons of dry matter per year. In addition wheat and barley after legumes produce more dry matter and a 1.5 million ton (20 per cent) increase in cereal straw can be expected.

Collectively, the lucerne and annual medics could add 12 million tons to the stock-feed system, and because their biological value for growth of annuals is at least 2-3 times that of the currently available range-land feed, the feed gap would be reduced. This would provide capacity to exclude from grazing selected areas of range and allow their regeneration, i.e.: reduction of overgrazing pressures on the rangelands.

Besides the high protein that the dry stems (approximately 10 per cent), and pods with seed (20 per cent) of medics contain, they have other important advantages for use in rotation with cereals (i.e. ley farming): they avoid to apply artificial nitrogen fertilisers and permit higher cereal yields and a potential increase in quality compared to long-term fallow wheat or continuous cropping.

The development of ley farming in Iran must emphasise on farm research using farmers' own equipment. Grazing management will be the major problem, particularly during the establishment year. Australian harvesting machinery can be used in Iran, but the cost is high and maintenance difficult. Systems based in stationary threshers and family labour would fit the Iranian requirements at present.

Of the currently available Australian cultivars of *Medicago polymorpha* only Serena for drier areas in the south and Santiago for more general use are likely to have much value in Iran. The Iranian ecotype Kamaraj, mixed with Santiago, would be valuable in all but the drier southern areas of less than 250 mm rainfall.

Iranian medic ecotypes should be commercially developed as soon as possible. An ecotype of

Medicago rigidula, west of Meyaneh, had a vigorous, prostrate and procumbent growth, good for soil conservation and grazing purposes, highly productive herbage and pods smooth or bearing more or less long tubercles which is not harmful for wool quality. Several ecotypes of *Medicago polymorpha* from Kamaraj, Kazaroon and Lali (Masjad Solyman) should likewise be bulked for further use in Iran.

Acknowledgements

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