

High yielding red gram for all seasons

By Our Agriculture Correspondent



The improved red gram variety can be grown during all seasons.

A HIGH yielding red gram (*Cajanus cajan*) variety, with high protein content, is developed by the scientists at the Department of Pulses, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University (TNAU), Coimbatore. The farmers recently released it for commercial cultivation.

Christened "CO (RG) 7", the improved red gram is a medium-duration (120 to 130 days) variety, and being a photo-insensitive type, it can be grown in all seasons, according to the scientists.

It yields reddish brown seeds with high protein (23.5 per cent). It had very low incidence of sterility mosaic disease and pod fly when compared to the check variety CO 5. A derivative of selection from PB 9825 (a cross derivative of ICP 8863 and AI 101; and PA 128 and TT 6), this new variety can be raised in both irrigated and rain fed conditions. It is found to do well in June-July, September-October and February-March seasons.

Higher yield

In multi-location trials conducted in Kharif 2000, it recorded an average yield of 833 kg per hectare, which is 26 per cent higher than that of CO 5 variety.

In the Adoptive Research Trials conducted during 2001-2002 and 2002-2003, this variety registered a yield of 914 kg per hectare, which is 9.7 per cent more than that of the check variety CO 5, according to the scientists.

In the All India Coordinated trials, the variety recorded an average yield of 1699 kg per hectare. The over all performance of this variety has been found good, and its average yield has been recorded as 1021 kg hectare.

In the irrigated fields it yielded on an average 1168 kg per hectare, and its output in the rain fed tracts is 915 kg per hectare. A seed rate of 25 kg is recommended to cover a hectare.

A spacing of 45 cm between rows and 15 cm within the rows is advocated. The seeds should be treated with bio-control agents such as *Trichoderma viride* to prevent the incidence of

diseases. Application of bio-fertilizers such as *Rhizobium* will prove to be highly beneficial.

Nutrient dosage

The nutrient dose should be decided based on the soil test results. About 25 kg nitrogen and 50 kg phosphorus should be applied as basal dressing.

Liberal quantities of farmyard manure should be incorporated in to the soil along with the final ploughing. The field should be irrigated immediately after sowing, and the next irrigation may be given on the third or the fourth day after sowing. Subsequent irrigations should be done based on the soil moisture regimen.

The pests may be controlled by using nuclear *polyhedrosis virus* and neem formulations. The crop should be harvested when 80 per cent of the pods mature.

The harvested plants should be stocked in shade for a few days before threshing.

Pulses

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Pulses in India have a special role in meeting the protein requirement of predominantly vegetarian population. They form an integral part of diet as source of protein. These crops have additional advantage for sustainable agriculture, because of their soil enriching capabilities and varied use as feed and fodder.

India is one of the major pulse growing countries in the world. The production of pulses in India in 2001-02 was 13.19 million tonnes, which was about 27-28% of the world production. Among the different pulses grown in the country, the respective share of production has been : chickpea (bengal gram / chana) 40.50% ; pigeon pea (tur /arhar) 17.90%; green gram (moong) 9.20%; black gram (urad) 9.10% ; lentils (masur) 6.10% and other minor pulses 17.20%. Among the important states engaged in growing pulses have been : Madhya Pradesh 22.90% ; Uttar Pradesh 18.12% ; Maharashtra 14.25% ; Rajasthan 10.84%; Andhra Pradesh 8.64% ; Karnataka 5.76% and others 19.49% . Thus about 80.51% of the pulses supply is contributed by five major states. Off late the production and area under pulses cultivation in the country has been stagnated.

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The New Technology Of Production Of Pulses

Author: Dr H.K. Jain

January 1983

India has given a more important place to pulses in its agriculture than most other countries. No other country grows so many different species of pulses, and covers so much area with these crops. The large-scale cultivation of pulses, and the widespread practice of vegetarianism in India cannot be a matter of coincidence. The Indian people must have realised hundreds of years ago, the nutritional value of pulses in their diet. The combination of *dal-chawal* (pulse-rice) or *dal-roti* (pulse-unleavened wheat bread) has come to be recognised as the standard fare in the average Indian diet. Modern science provides strong support for this traditional practice, for it is now recognised that the chemical score of protein (that is, its biological value) improves greatly when wheat or rice is combined with one of the pulses because of the complementary relationship of the essential amino acids. The lysine content of protein in many of the pulses is as high as 6 per cent compared to 2.5 per cent of the cereal grains.

The table lists the more important of the pulse crops of India and their relative position in terms of production and area; it will be seen that the two most important pulse crops of India are Bengal gram (or gram) and red gram, which together account for nearly 45 per cent of the area and more than 60 per cent of the total production of pulses in the country. Next in order of importance are green and black gram, which are closely related. Their yields, however, are low and although they account for an area of more than 20 per cent, their total production is only about 1.25 million tonne. Both green gram and black gram are short duration pulses -- some of the varieties taking only about 60 days from sowing to harvesting. Pulses such as horse gram and lathyrus occupy sizable areas but are highly localised in their distribution. Of the other pulses which together account for nearly 7 per cent of the total area planted with these crops, the most important perhaps are the cow pea and the Indian bean.

[Table]

An important feature of contemporary agriculture in India is that while the production and productivity of most of the cereal crops has registered a major advance during the last 15 years, the pulse crops as a group, have shown no such trend. The production of pulses in the last 20 years has remained stagnant, around 12 million tonne. From a purely scientific standpoint, there are no basic reasons why India, in the next five to ten years, should not see the same kind of major advance in the production of pulses as has already been achieved in crops such as wheat and rice.

India can produce more than 20 million tonne of pulses in the next five to eight years and more than 25 million tonne in the next 10 years. This would be possible, however, only if a series of bold policy decisions are taken at this stage to make available to farmers the vital inputs needed for increasing the production of these protein-rich food crops. Pulses need handling which is different from those of the cereal crops, and even though they call for a smaller investment, a new institutional framework and service infrastructure have to be created to ensure that farmers are able to use these inputs.

Massive programmes on the multiplication of seeds of improved varieties have a protection technology to these crops, as it is well known that pulses suffer huge losses in their production because of the attack of a number of insect pests, such as the pod borer in Bengal and red gram. The losses due to insect pests are much higher in the case of pulses than in cereal grains. It is not reasonable to expect that millions of small and marginal farmers will buy their own dusters, sprayers and other equipment for the application of pesticides in their small fields. These operations have to be organised on a community basis with the help of specially created service agencies for this purpose.

Some amount of protective irrigation has to be extended to pulses, which have traditionally been grown as purely rainfed crops, unlike rice and wheat which account for more than 50 per cent of the available irrigation water in the country. Most pulse crops may require not more than one or two irrigations to give relatively high yields.

The long-term solution to the problem of pulse crops lies in improving their

agronomic management within their traditional habitats in the states of Madhya Pradesh, Bihar, eastern Uttar Pradesh, Maharashtra and Andhra Pradesh. The foremost requirement in these traditional pulse areas is to help farmers adopt moisture conservation practices and use moderate doses of chemical fertilisers, other inputs and, above all, pesticides.

For an immediate increase in the production of pulses, scientists have evolved another strategy. The pulse crops must be moved in time and space so that they can be provided with better agronomic environments in terms of soil fertility, irrigation and other management inputs, which today are most commonly reserved for cereal crops such as wheat and rice. At the same time the scientists recognise that moving pulse crops to these areas improved management in states such as Punjab, Haryana, western Uttar Pradesh and Rajasthan must be done without much competition with the cereal crops, which remain the staple food for most people. In order to achieve this objective of combining the cultivation of pulses with those of the cereal crops, agricultural scientist in the last 10 years have evolved a large number of new varieties of pulses which are characterised by short-maturity duration. The main advantage of these new varieties is that they can be fitted in a series of multiple inter-cropping pattern with the cereal and other crops.

A large number of improved varieties of pulses are now available including Pusa 209, Pusa 212, and the more recently evolved varieties such as Pusa 257 and Pusa 261, in Bengal gram, Pusa Ageti, UPAS 120, Pusa 74, Hybrid 3C and Khargaon 2 in red gram, Pusa Baisakhi, Pusa 16, Kanpur 851, G 65, Varsha and several others in green gram. These new varieties are already giving rise to cropping patterns not considered possible earlier. For example, the wheat-*arhar* rotation can now be practiced in most parts of north-western India with the availability of *arhar* varieties which can be harvested in less than 150 days. It had been estimated that the country could produce 3 million tonne of additional red gram by adopting rotation over hectares in states such as Punjab, Haryana, western Uttar Pradesh, Rajasthan and Delhi.

In the case of Bengal gram, simple pest control measures and adoption of the new varieties hold possibilities of doubling the yield of this crop, which at present is very low -- nearly 8 quintals per hectare. Some of the new gram varieties evolved by the IARI scientists have given yields varying from 25 to 30 quintals per hectare. Some of these new varieties should also make it possible to fit Bengal gram into rotation with cereal crops such as rice. A cereal-gram rotation has considerable potential to become popular in eastern Uttar Pradesh and Bihar, where many farmers normally leave their lands fallow after late harvesting of paddy. The new Bengal gram varieties are particularly suitable for late planting.

It is the new varieties of green gram, however, which probably offer the largest potential for a major increase in production in the next few years. The advantage of these varieties lies in the fact that they can be harvested in less than 70 days. Because of this factor, Indian agriculture can be made more intensive within the irrigation command areas, where farmers can now take three crops instead of the traditional two crops during the rabi and kharif seasons.

Indeed, the availability of short duration varieties of green should help make the spring/summer season as important as the rabi and the kharif. It is now possible to practice a three-crop rotation such as wheat-*mung*-rice, wheat-*mung*-maize, wheat-*mung*-bajra and wheat-*mung*-sorghum.

More important, the short duration varieties of green gram can be inter-cropped with a wide range of cereal and other crops including maize, sorghum, millet and sugarcane. This way, it should be possible for us to bring 5-10 million hectares of land into inter-cropping systems where green gram becomes a bonus crop in addition to the normal harvest of the main crop. Last but not the least, the short-duration varieties of green gram should increasingly make it possible to practice double cropping in some of the country's vast rainfed lands, where the total rainfall is more than 500 mm. Traditionally, farmers in these drylands have used either a rabi crop or a kharif crop. With the short duration pulse varieties, it is now possible to practice double cropping such as *mung* followed by mustard or sunflower or Bengal gram. Nearly 2 million hectares of land could be thus brought under double cropping in states such as Bihar, Andhra Pradesh and Madhya Pradesh.

The most important advantage of short duration varieties of pulses is that they

do not compete with the main crop and, indeed, they enrich the soil through their capacity to fix nitrogen from the atmosphere with the help of bacteria in their rootzone. The new technology of pulses which is now being developed both in the form of a higher genetic potential for yield and the new agronomic and plant protection measures hold promise of a major advance in the production of these crops. Varieties of Bengal gram, for example, are now in the breeders' assembly line which have a yield potential of 4 tonne per hectare.

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