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TISSUE CULTURE STUDY OF ANY PULSE CROP FOR CALLUS INDUCTION

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ABSTRACT:

In the majority of crop breeding efforts, the rate of yield increment is inadequate to meet the rising demand for food that is being driven by the fast-increasing population throughout the world. The extremely lengthy lifetime of the crop poses a barrier in the way of enhanced crop variety creation in plant breeding due to the fact that there is not enough time. It is possible that developing a new cultivar will take between one and twenty years due to the several processes of crossing, selecting, and testing that are required in the development of new plant types. Rapidly developing superior plant varieties is one strategy that might help alleviate the challenges associated with a lack of food and increase the level of food security. The traditional agricultural practises that have been used for a considerable amount of time have led to a reduction in the genetic variety of crops. Several conventional and molecular methods have been utilized, such as genetic selection, mutagenic breeding, somaclonal variations, whole-genome sequence-based approaches, physical maps, and functional genomic tools, in order to improve agronomic traits associated with yield, quality, and resistance to biotic and abiotic stresses in crop plants. These methods include genetic selection, mutagenic breeding, and somaclonal variations.

Keywords: Culture, Study, Traditional, Agricultural

INTRODUCTION

India is the most important country in the world in terms of both the production and consumption of pulses, accounting for around 25–28% of the overall output. Farmers in India are now cultivating a broad variety of pulse crops, such as chickpeas, pigeon peas, black gramme, green gramme, field peas, soybeans, and lentils, under a variety of agro-climatic conditions. Some of these circumstances include: Green gramme (Vigna radiata L.) and black gramme (Vigna mungo L.) are two important short-season grain legumes that have wide adaptability due to their low input requirements in the conventional farming system of tropical and subtropical regions. Both of these pulse crops are cultivated in India. Black gramme (Vigna mungo L.) and green gramme (Vigna radiata L.) They provide humans and cattle with a very diverse range of nutrients, including proteins (25-26%), fats (1.5%), carbohydrates (60%), amino acids, fibres, vitamins, and minerals. Because of their unique capacity to symbiotically fix atmospheric nitrogen, these two types of crops perform a particular function in the agricultural ecosystem. Additionally, the leftovers from these crops are utilized to enhance the soil's physical, chemical, and biological qualities. As a result, black gramme and green gramme are becoming more significant in the context of the development of environmentally responsible agriculture.

Meteorological drought-

This kind of drought takes place when there is a protracted period of large decline (more than 25%) in average precipitation, which results in a natural lack of water that may be used.

Agricultural drought-

This kind of drought takes place when there is a protracted period of large decline (more than 25%) in average precipitation, which results in a natural lack of water that may be used.

Hydrological drought

This type of drought occurs when meteorological drought prolonged for a sufficient period of time causing depletion of surface water with consequent drying of water reserves in aquifers, lakes, streams and rivers, cessation of spring flows and fall in ground water levels below an established statistical average. Again, hydrological drought can occur even during the times of average or above average precipitation, if human demand for water is high and increased usage has lowered the water reserves.

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PULSE CROPS

Pulse crops are annual grain legumes that produce big seeds that are historically used for either the consumption of humans or the feeding of cattle. Pea, lentil, chickpea, faba bean, dry bean, soybean, chickling vetch (grass pea), and lupin are the types of pulse crops that may be cultivated in Saskatchewan. Lupin is also grown there.

Pulse crops have the potential to get a significant portion of the nitrogen that they need for growth from the air that is contained within the soil that surrounds their root systems. This occurs when the plant develops a connection with a kind of soil bacterium known as Rhizobium that is advantageous to both parties.

NITROGEN FIXATION

Nitrogen (N) fixation is the process by which legume crops and certain Rhizobium bacteria (rhizobia) work together to make nitrogen from the soil air around the roots of the plant accessible for use by the plant. This process is referred to as "fixing" nitrogen. Rhizobia colonise the root hairs of the plant very immediately after germination. After they have entered, the bacteria continue their invasion by creating an infection thread that travels deeper into the root. In response to the rhizobia's fast multiplication inside the root, the plant develops specialised structures known as nodules, which are responsible for enclosing the rhizobia within their confines. Nodulation is the term used to describe the process by which root infections lead to the creation of nodules. It is possible that nodulation won't become visible on the plant roots for another three to four weeks after the seed has germinated.

INOCULATION

Nitrogen inoculants are often referred to as products that include Rhizobium bacteria. Inoculation is the process of adding the proper Rhizobium bacteria to the soil in quantities that are adequate to guarantee effective nodulation. This may be accomplished by either covering the seed with an inoculant that is liquid or peat-based powder, or by treating the soil with an inoculant that is either granular or liquid. When used correctly, commercial inoculants guarantee that each plant is presented with a sufficient quantity of bacteria to begin the process of nodulation and nitrogen fixation. This occurs when the bacteria attach themselves to the plant's roots. Because Rhizobium bacteria do not move through the soil very easily, it is necessary for the inoculant to make physical contact with the growing seedling in order for there to be an infection of the root hairs. Distinct pulse crops need

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specific Rhizobium species for nodulation. For instance, a certain species of Rhizobium that is able to cause nodulation in lentil and pea crops does not have the ability to cause nodulation in chickpea. If the inoculation is performed with the incorrect species of Rhizobium, there will be no positive result. The nitrogen-fixation process is often not optimised in soils because there are typically insufficient populations of the appropriate Rhizobium bacteria.

FERTILIZER AND INOCULATION

A soil test is the most effective instrument for providing advice for the fertility requirements of crops. Before the process of nitrogen fixation can begin, the seedlings of pulse crops extract nitrogen from the top 15-30 centimetres (6-12 inches) of the soil. Nitrogen that is found under this depth will not be accessible to young plants. It might take anywhere from three to four weeks for nitrogen fixation to become firmly established.

Nitrogen is essential for the production of large pulse crop yields; however, the use of nitrogen fertiliser is often not needed. Pulse crops have the potential to obtain a considerable percentage of the nitrogen that they need via the process of nitrogen fixation provided they are appropriately infected with the right Rhizobium inoculant. Nitrogen that is available in the soil at the time of seeding (also known as soil test levels of nitrogen) and nitrogen that is released from the soil and plant waste as a result of decomposition throughout the growth season are both sources of the remaining nitrogen that is needed. Some farmers choose to apply modest rates of starter nitrogen to their pulse crops in order to supply supplementary nitrogen prior to the beginning of nitrogen fixation.

FAILURE OF NODULATION

If careful inspection of the pulse crop root reveals little or no nodulation, inoculation may have been ineffective because of adverse conditions such as dry topsoil. If the field has a history of the same pulse crop, residual Rhizobium bacteria present in the soil may initiate enough nodulation to meet nitrogen requirements for a moderate yield.

If further inspection proves that nodulation has not occurred, and deficiency symptoms appear, a top-dressed application of nitrogen fertilizer may be an option. Limited information is available for recommendations for Saskatchewan growers, so the decision on the amount and formulation of fertilizer to be applied should be made after careful consideration.

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Submit crop tissue samples to a soil test laboratory to determine nutrient levels present in the plant. The laboratory will provide instructions for the proper collection and packaging of the samples. Tissue samples should be taken as soon as possible in the growing season and prior to first bloom. The laboratory will work with the producer to determine the course of action to be taken, based on local moisture conditions and target yields.

USING CHLORINATED WATER WHEN APPLYING STICKER INOCULANT.

The growth of seedlings may be slowed down by insufficient quantities of accessible phosphate, and the plant's capacity to fix nitrogen can be diminished. A desiccation (drying out) of the inoculant and the subsequent mortality of the Rhizobium might occur if the soil is dry within the first two weeks after sowing has taken place.

The colonization of the roots by native Rhizobium bacteria is possible; however, the local Rhizobium bacteria may not be very effective nitrogen fixers. In other instances, nodules may develop; however, they will not contain an interior that is pink or red and will thus be ineffective.

Desiccation of the Rhizobium may occur if seeds are planted too shallowly into soil that continues to dry out after the seeds have been planted.

The crop will preferentially utilize nitrogen that is taken from the soil when there are high amounts of accessible soil nitrogen (more than 55 kgN/ha or 50 lbN/acre).

It is possible that the number of bacteria on the seed coat will be reduced if a sticker with a peat powder inoculant is not used. This will lead to a lower rate of nodulation. The majority of peat powder inoculants come complete with an application sticker that has been pre-formulated and is ready to use.

In the seeder tank, granular inoculant and fertiliser are being mixed together. After three hours, there was a 93% reduction in the number of live bacteria counts in the granular inoculant that had been combined with 11-51-0 fertiliser.

It is possible for unequal application to result from granular inoculants that have bridged in the seeder tank (Figure 4). To prevent bridging, ensure that you follow the guidelines on the label provided by the manufacturer.

INOCULANT FORMULATIONS

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Powder made from peat is a very fine powder that contains a predetermined quantity of Rhizobium bacteria per gramme. To ensure that the inoculant is well adhered to the seed, an extra solution is used. There is a variety of commercially produced stickers available. Stickers may also be made by dissolving corn syrup, table sugar, or honey in water to a concentration of 10%. This method yields the same results. It's also possible to use powdered milk as an efficient adhesive. On the other hand, milk-replacer products that include antibiotics will be effective in killing the Rhizobium bacteria.

Onto the surface of the seed should be sprayed or dribbled the sticker until it is completely covered. After the seed has been wetted, the inoculant is sprayed over it in accordance with the instructions provided by the manufacturer. It is possible to inoculate a tub or cement mixer with just a few seeds at a time. When working with larger quantities, the sticker and inoculant have to be gradually incorporated with the seed as it is fed into an auger. Make sure that the auger is cleared out before it is turned off to avoid a buildup of collected sticker throughout the process. If you have issues with bridging, give the seed a chance to dry out in a cool spot for an hour before you fill the seed tank.

INOCULANT STRAIN

Inoculants may be obtained in either a single-strain or mixed-strain composition depending on the manufacturer's preference. Mixed-strain inoculants may include bacteria that are successful in commencing the process of nitrogen fixation in more than one kind of pulse crop. Alternatively, they may contain two or more strains that are exclusive to a particular type of pulse crop. One kind of inoculant is known as a mixed-strain inoculant. One such product is one that works extremely well in both pea and lentil. Rhizobium that is especially successful in a single pulse crop may be found in single-strain inoculants. Always be sure that the inoculant you apply is appropriate for the kind of pulse crop you are growing.

INOCULANT FORMULATION EVALUATIONS

The effectiveness of various inoculant formulations when applied to chickpea. Granular inoculants were either applied in the seed row or placed in a side-band, 2.5 centimetres (1 inch) to the side, and at depths of either 2.5 or 8 centimetres (one or three inches) below the seed. Peat-based and liquid inoculants were applied directly to the seed, while liquid inoculants were applied to a depth of 2.5 centimetres (one inch) below the seed. According to the findings, the use of granular formulations for the inoculation process was either equivalent to or superior to the use of other formulations. In several situations, the peat-based

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powder and liquid formulations functioned just as well as the granular formulation, particularly where there was no restriction on the amount of moisture in the soil. Granular materials were shown to perform better in studies conducted in drier soil conditions. When compared to an inoculant that is put on the seed itself, an inoculant that is inserted in the granules that are placed below and to the side of the seed in wet soil may result in improved Rhizobium survival and enhanced fixation. Granular inoculants encouraged the growth of nodules on lateral roots, and the results of the tests showed that yields were increased when there was adequate nodulation on lateral roots.

OBJECTIVE

1. To study on the tissue culture study of any pulse crop for callus induction
2. To study on the using chlorinated water when applying sticker inoculant

REVIEW LITERATURE

Adarsh S. (2019) The global economy and food supply are both vulnerable to the effects of climate change. The declining supply of pulses as well as their importation indicate the critical need for increasing production. Because there is a restriction on the amount of land that can be farmed, the only method to increase productivity is to use cropping systems that contain pulses. This is where we will concentrate on increasing yield in both the spatial and temporal aspects. Intercropping, sequential cropping, mixed cropping, relay cropping, and paira/utera cropping are the several methods that make up a cropping system that also includes pulses. They are in competition with companion crops for light, space, the amount of residual moisture left in the soil, and accessible nutrients.

According to Wu (2022), it was discovered that the plant height of water-stressed citrus seedlings was lowered by up to 25 percent when compared to the height of control seedlings. Due to the inhibiting effect of water shortage on growth promoting hormones and/or due to blocking up of xylem and phloem vessels, which hinders translocation through the vessels, decreased plant height in water-limited environments is associated with reduced cell turgor, which decreases the rate of cell division and cell expansion. Additionally, a deficiency in soil moisture impairs the process of mitosis, cell elongation, and expansion, which results in reduced growth

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Abass and Mohamed(2019) found that there was a significant decrease in the fresh and dry weight biomass of the shoots and roots of several common bean genotypes. The loss of soil moisture led to a considerable reduction in the amount of biomass produced by sunflowers and apples. These results demonstrate that a lack of water may have an impact on the control of photosynthetic enzymes, which in turn can have an effect on the creation of dry matter. Under conditions of acute water scarcity, the improvement of the plant's water status is due to the combination of slower development of the shoots and unabated expansion of the roots. Under conditions of water stress, numerous plant species, including wheat and Medicago sativa L., have been seen to allocate a greater portion of their biomass to their roots. The alteration of the root system in this way has favourable effects.

Sharma et al., (2015) has been utilised in India for the treatment of jaundice, in particular, within the Ayuverda, Unani, and Siddha medical systems for the last about two thousand years. Drinking a decoction or tea made from P. niruri is used as a diuretic to cure renal and liver problems, as well as colic and venereal illnesses, all the way from Hainan to Indonesia. In addition, it has been shown to be effective as an expectorant (for treating coughs in children), febrifuge, emmenagogue, and antidiarrhetic. The pulverised herbs are put on the affected areas of the skin to treat contusions and other skin ailments. As a tonic for the stomach, a decoction made from the entire plant may be utilised.

Andrea Espósito (2016) There are more than 600 different genera and over 13,000 different species that belong to the family of plants known as leguminous plants. Dried peas, edible beans, lentils, chickpeas, cowpeas, mungbean, blackgram, and pigeonpea are the most commonly cultivated ones for human consumption due to their high nutritional value. Among these, the term "pulses" refers only to dried seed crops, excluding those grown primarily for oil extraction (like soybean).

RESEARCH METHODOLOGY

The Indian Council of Agricultural Research (ICAR), the Department of Agriculture and Cooperation (DAC), and the Departments of Animal Husbandry, Dairying, and Fisheries make up the components that make up the Union Ministry of Agriculture. The Director General and the Secretary serve as the ICAR's leaders. Secretaries serve in that capacity atop both the DAC and the AHDF. Within the Crops Division of the Department of Agriculture and Cooperation, there are a total of nine Crop Development Directorates (CDDs), one of

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which is called the Directorate of Pulses Development. In addition to its administrative duties, the Directorate of Pulses Development is charged with the monitoring of Centrally Sponsored Schemes in respect of Nodal crop - pulses and major crops of Madhya Pradesh and Chhattisgarh. This is just one of the many responsibilities that fall under its purview. In the year 1971, it was formed in the city of Lucknow, which is located in the state of Uttar Pradesh. In the year 1995, the Regional Extension Unit that was functioning in the city of Ahmedabad was merged into it as part of the reorganisation of Crop Development Directorates. The Vindhyachal Bhavan in Bhopal, Madhya Pradesh serves as the location of the DPD's National Head Quarters.

DATA ANALYSIS

SPECIAL INITIATIVES TAKEN MINIMUM SUPPORT PRICE (MSP).

The National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED), located at Nafed House, Sidhartha Enclave, New Delhi – 110 014, is the Nodal agency of the Government of India to undertake procurement of Redgram, Moongbean, and Urdbean during the Kharif season, and Gram and Lentil during the Rabi season. This is done as part of the Price Support Scheme (PSS). When the prices of the aforementioned commodities reach or fall below the specified support prices for a given year, purchases are made under the PSS via major procurement centres.

The following is a list of the grade criteria for Tur, Moongbean, and Urdbean for the Kharif 2012-13 marketing season as well as Gram and Lentil for the Rabi 2011-12 marketing season that have been mandated by the Government of India under PSS for fair average quality (FAQ):

GENERAL CHARACTERISTICS: GRAM

- be the mature grains that have been dried;
- be consistent in size, shape, and colour; and
- be delicious, hard, clean, healthy, and free from moulds, live insects, offensive smells, discoloration, mixing of harmful substances, and any other contaminants, with the exception of the amount provided in the schedule below:

- be in a healthy state that is suitable for retail sale.

abide by the rules of the PFA.

Table 1A schedule illustrating the highest allowable limits for the various types of refraction:

Grade	Foreign matte r %	Other food grains %	Dama ge grains %	Slightly damaged touched grains %	Immature shriveled & broken grains %	Admixture of other varieties%	Weevilled grains %
FAQ	1.0	3.0	3.0	4.0	6.0	5.0	4.0

Tur, Moongbean, and Urdbean are examples of general traits.

The size, shape, and colour of the pulses must be generally consistent with one another.

Pulses must have a pleasant taste, be spotlessly clean, and be devoid of any noxious odours, moulds, weevils, discoloration, admixtures of harmful substances (including colouring matter that has been added), and any other types of impurities. Table 4.2

Table 2 The exception of those that are specified in the schedule.

S. No.	Special characteristics	Maximum limit of tolerance (% by weight per qtl.) for FAQ:
1	Foreign matter	2
2	Admixture	3
3	Damaged pulses	3
4	Slightly damaged pulses	4

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5	Immature and shrivelled pulses	3
6	Weevilled pulses	4
7	Moisture	12

Foreign affairs Include things like dust, stones, lumps of dirt, chaff husks stem, straw, and any other impurities, as well as seeds that may be eaten and seeds that cannot be eaten.

- Pulses that are not considered to be the major pulses are considered to be admixtures.
- Pulses are considered to be damaged if they are internally damaged or discoloured to the point that the damage or discoloration has a significant impact on the quality of the pulses.
- Slightly damaged pulses are those pulses that are just superficially damaged or discoloured, such that the damage or discoloration does not significantly influence the quality of the pulses.
- Slightly damaged pulses are also known as "lightly damaged" pules.
- Immature and shrivelled pulses are pulses that have not fully matured to their full potential.
- Pulses are said to be weevilled if they have been partly or fully devoured by weevils or other grain insects. These insects may dig into the pulses.

The Commission for Agriculture Costs and Prices (CACP) is the Nodal agency that is responsible for determining the Minimum Support Price (MSP) of designated agricultural commodities such as pulse crops such as arhar, moongbean, gramme, and uradbean. Every season, the MSP for each agricultural item is calculated taking into account the cost of cultivation, prices on the international market, the benefits to farmers, and the opinions of stakeholders. Table 4.3 contains the MSP that the Government of India, on the advice of the CACP, has announced for the most recent several years.

Table 3 Minimum Support Price of identified crops of pulses declared by the Govt. of India.

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Crop / Year	Arhar	Monogeny	Urdbean	Gram	Lentil
2011	1320	1320	1330	1200	1300
2012	1320 + 5 *	1330 + 5 *	1330 + 5 *	1220 + 5 *	1300 + 5 *
2013	1360	1370	1370	1400	1500
2014	1390	1410	1410	1425	1525
2015	1400	1520	1520	1435	1535
2016	1410	1520	1520	1445	1545
2017	1550^^	1700^^	1700^^	1600	1700
2018	2000	2520	2520	1600	1700
2019	2300	2760	2520	1730	1870
2020	3000	3170	2900	1760	1870
2021	3200 +5**	3500+5**	3300+5**	2100	2250
2022	3850	4400	4300	2800	2800

Help specifically for the drought

In addition to the minimum support price (MSP), a bonus of forty rupees per quintal is given.

Farmers should get an extra incentive in the amount of Rs. 5 every kilogramme of arhar, urdbean, and moongbean that is sold to procurement agencies throughout the harvest / arrival period of two months.

Quantity of crop produce procured.

In India, vegetarianism is practised by the vast majority of the people. Therefore, include pulses in one's diet is necessary in order to maintain the body physically healthy. The farmers

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who grow pulses sell their crop, therefore limiting the amount of pulses that are necessary for their families. The amount of pulses that NAFED bought from MSP is shown in Table 4.4 .

Table4. 4 Quantity of pulses purchased by NAFED on MSP during 10-11.

This apart, NAFED purchased 18625.68 MTS Pulses valued at Rs.51.78 crore viz. Arhar, Gram, Masoor, Moongbean, Urdbean and assorted Pulses in its outright account. The details are given in Table 4.4 .

Table. 4Details of quantity with value purchased under outright account.

Commodity	Quantity (in MTs)	Value (Rs.in lakhs)
Arhar	391.94	123.50
Assorted Pulses	579.22	290.15
Gram	12718.38	2925.44
Masoor	203.87	56.51
Moongbean	2291.59	932.67
Urdbean	2440.68	849.71
Total	18625.68	5177.98

Prevalent Marketing channels:

Marketing channels are the pathways that are taken in order to move grains and pulses from the point of production to the end users of these products. In this context, private and regulated markets use a variety of different channels, which may be broken down as follows:

Private: I Producer – Dal Miller – Consumer, (ii) Producer – Village Trader – Dal Miller – Wholesaler – Retailer – Consumer, (iii) Producer – Dal Miller - Retailer - Consumer, (iv) Producer – Wholesaler – Dal Miller - Retailer – Consumer, (vii) Producer – Commission Agent – Dal Miller – Wholesaler – Retailer – Consumer (For full Greengram), (vi) Producer – Wholesaler – Retailer – Consumer (For whole Greengram), and (vii) Producer – Wholesaler – Retailer – Consumer (For whole Greengram).

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Institutional: I Producer – Procuring Agency – Dal Miller – Consumer, (ii) Producer – Procuring Agency – Dal Miller – Wholesaler – Retailer – Consumer, and (iii) Producer – Procuring Agency – Dal Miller – Retailer – Consumer. Institutional: I Producer – Procuring Agency – Dal Miller – Wholesaler – Retailer – Consumer.

Important markets in India and abroad.

As of the 31st of March in 2011, India had a total of 7246 regulated markets, which were broken down as follows: 2433 Principal markets and 4813 Sub market yards. The products of agriculture, such as whole grains of pulses and Dal, are marketed and purchased in these 35 states and unorganised territories that are home to these marketplaces. In these, each and every activity is carried out in accordance with the criteria. The most significant pulses markets are detailed in Annexure 31. (p 198).

The following are some of the most important import markets for pulses across the world: 1) Small chickpea: Burma, Tanzania, Australia, China, UAE, and 4) Mungbean: Burma, Singapore, China, and Australia 5) Green and yellow peas: Canada, Australia, Hungary, Tanzania, and the US 2) Pigeonpea: China, Tanzania, and Burma 3) Blackgram: Burma, Thailand, and Singapore 4) Mungbean: Burma, Singapore, China, and Australia 6) Lentil: The Netherlands, Syria, Canada, Turkey, and China. 7) Large Chickpea or Kabuli: Australia, Canada, Turkey, Iran, and Burma. Bangladesh, Sri Lanka, and the United Arab Emirates are among the most important markets for the export of pulses from India. Other important markets include the United States, Nepal, Saudi Arabia, Kuwait, the United Kingdom, Egypt, Malaysia, Canada, Spain, Italy, Pakistan, the Yemen Republic, Algeria, and Bahrain.

CONCLUSION

After conducting an in-depth analysis of horse gram's nutritional and therapeutic properties, we have arrived with the conclusion that the plant is an abundant source of both nutrient and antinutrient content. Horse gramme has a nutritional content that is equivalent to that of other types of pulse crops. In addition to their typical function of providing proteins and carbs, horse gramme has been shown to possess significant amounts of antioxidant and radical scavenging properties. It is an excellent source of a wide variety of naturally occurring bioactive compounds, including phytic acid, fibre, and phenolic acid, amongst others. These bioactive chemicals offer a huge amount of untapped potential for treating a wide range of

illnesses, including the common cold, throat infections, fever, urinary stones, asthma, bronchitis, leucoderma, and other conditions. BBIs, also known as proteinase inhibitors, have been shown to be effective in treating inflammatory and autoimmune illnesses, as well as obesity and numerous degenerative diseases.

REFENCES

1. BBS, 2006. Monthly Statistical Bulletin-Bangladesh. Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Dhaka. p. 558.

2. BINA, 2004. High yielding variety of blackgram (BINA Mash-1), Bangladesh Institute of Nuclear Agriculture, Annual report June 2004, P. O. Box No. 4, Mymensingh. p. 1.

3. Das, D. K., Prasanna, B., Prakash, N. S. and Sarin, B. N. 2002. Improvement method of regeneration of blackgram (Vigna mungo L.) through liquid culture. In vitro Cellular

4. Develop. Biol. Plant., 38(5): 456-459. Geetha, N., Venkatachalam, P. and Rao, G. R. 1997. Plant regeneration and propagation of blackgram [Vigna mungo (L.) Hepper] through tissue culture.

5. J. Tropic. Agric., 74(1): 73-76. Geetha, N., Venkatachalam, P. and Rao, G. R. 1998. In vitro plant regeneration from shoot tip culture of blackgram (Vigna mungo L. Hepper).

6. J. Tropic. Agric., 36(1/2): 6-11. Gomez, K. A. and Gomez, A. A. 1984. Statistical Procedude for Agricultural Research. 2nd Edn. Intl. Rice Res. Inst. A willey Int. Sci. Pub., pp. 28-92.

7. Gowda, C. L. L. and Kaul, A. K. 1982. Pulses in Bangladesh. Joint publication of Bangladesh Agric. Res. Inst. & FAO,

8. Joydebpur, Dhaka, Bangladesh. Kaul, A. K. 1982. Pulses in Bangladesh. BARC (Bangladesh Agricultural Research Council), Farmgate

Anupam Kumari *, *University Department of Botany: B.R.A. Bihar University, Muzaffarpur. India*

9. Dhaka. P. 27. Khawar, K. M. and Özcan, S. 2002. Effect of Indole-3-Butyric Acid on in vitro Root Development in Lentil (Lens culinaris Medik.). Turkey J. Bot., 26: 109-111.

10. Lawn, R. J., Russell, J. S. and Coates, D. B. 1978. Regur: A blackgram (Vigna mungo L. Hepper) cultivar for grain production. J. Australian Inst. Agril. Sci., 44: 112-114.

11. Mathur, V. L. and Om Prakash. 1997. In vitro studies in Vigna mungo L. Hepper. Legume Res., 20(3/4): 203-206. Meijer, E. G. M. and Broughton, W. J. 1981. Regeneration of whole plants from hypocotyl, root, and leaf derived tissue cultures of the pasture legume Stylosanthes guyanensis.

12. Physiol. Plant., 52 (2): 280-284. Mian, A. L. 1976. Grow more pulses to keep your pulse well, an Assay of Bangladesh pulses. Dept Agron. BAU. Mym. pp. 11-15.

13. Murashige, T. and Skoog, F. 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultures. Physiol. Plant., 15: 473-497.

14. Nakamura, T. and Maeda, E. 1989. Scanning electron microscope study on Japonica type rice callus cultures with emphasis on plantlet initiation.

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