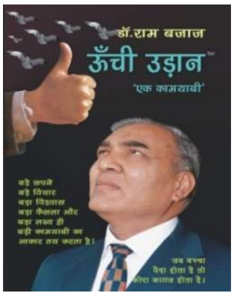
DR. RAM BAJAJ’S – AGRICULTURAL FINDINGS

Date: 16th March 2015



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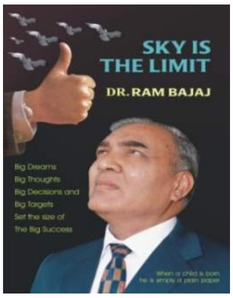
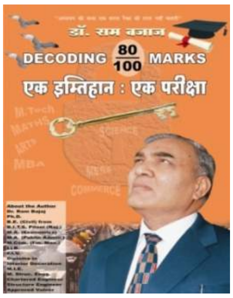
एक अमीर एक गरीब



SKY IS THE LIMIT



Decoding 80/100 Marks
एक इम्तिहान : एक परीक्षा

Ph.D,

B.E. (Civil Engineering) From

B.I.T.S, Pilani

M.A. (Economics)

M.A. (Public Admin.)

M.Com (Fin. Man.)

L.L.B.

Diploma In Interior Decoration M.I.E.

M. Struct E.

F.I.V

Chartered Engineer

Structural Engineer

Approved Valuer

Bikaner (Rajasthan) Historic Break through in bumper double production of wheat by Dr.Ram Bajaj using enriched tissue culture biofertilizer inoculation made at site. “No Tillage” done.

Best response of wheat crops–using biofertilizer (Azotobacter sp. and Azospirillum sp.) inoculation under different levels have been verified tested & estimated. The symbiotic interaction between two or more-non legume wheat plants & symbiotic friendly developments of roots between two or more plants, not only boost plant nutrition but increase the number of spikes & number of grains in wheat & spikes as well as height & biological yield.

No. of spikes per square meter = 600 to 650M^{-2} against the normal spikes = 300 spikes M^{-2}
No. of grain per spikes = 45 to 52 grain/spikes against the normal 25 to 30 grains/spikes
Height of wheat plant = 120cm to 100cm against the normal 80cm to 90cm

100% organic wheat with zero chemical fertilizers & pests. Site open for inspection till April 25, 2015 by pre-appointment. Please send your experts immediately.

(1) **Introduction**

Wheat *(Triticum aestivum L.)* is an important staple crop around the world. Its importance has risen even more due to frequently experienced food shortages and its role in world trade. Wheat ranks first among the cereal crops, accounting for 30% of all cereal food worldwide and major food for over one third of world people that provides about 20% of the total food calories directly or indirectly for the human race. Increasing wheat production to meet higher demands by growing populations is still a challenge in many countries.

(2) Maintaining soil fertility in sandy soil and use of plant nutrients in sufficient and balanced amount is one of the key factors in increasing crop yield. Nitrogen (N) is the most important nutrient supplied to most non-legume crops, including wheat. The most important role of N in the plant is its presence in the structure of protein and nucleic acids, which are the most important building and information substances of every cell. In addition, N is also found in chlorophyll that enables the plant to transfer energy from sunlight by photosynthesis. Thus, N supply to the plant will influence the amount of protein, amino acids, protoplasm and chlorophyll formed. Moreover, it influences the cell size, leaf area and photosynthetic activity. Therefore, adequate supply of N is necessary to achieve high yield potential in crops. N fertilizer is known to affect the number of tillers m^{-2}, number of grains $spike^{-1}$, spike length and weight.

(3) Increasing and extending the complete role of biofertilizers shall reduce the need for chemical fertilizers and decrease adverse environmental effects. They can play a significant role in fixing atmospheric N and production of plant growth promoting substances. Therefore, in the development and implementation of sustainable agricultural techniques, biofertilization has great importance in alleviating environmental pollution and deterioration of nature. *Azotobacter* sp. and *Azospirilum* sp. are used as biofertilizers in the cultivation of many agricultural crops. The estimated contribution of these free-living N fixing prokaryotes to the N input of soil ranges from 0-60 kg/ha to 160 kg/ha. Existence of microbial communities like *Azotobacter* sp. and *Azospirillum* sp. in the rhizosphere promotes the growth of the plant through the cycling and availability of nutrients, increasing the health of roots during the growth stage, by competing with root pathogens and increasing the absorption of nutrients and water. During our study on the effects inoculation with *Azotobacter* sp. and *Azospirillum* sp. on wheat we observed that inoculated wheat plants gave higher plant height, spike per unit of area, grains per spike, grain weight, biological yield, grain yield and straw yield compared to non-inoculated cultivars.

(4) **Materials and Methods**

In order to study the effects biofertilizer inoculation on grain yield, yield components and protein content of wheat (*Triticum aestivum* L.). The sowing was done directly without ploughing and normal own seeds of wheat were planted at a target population of 300, 400, 600 & 650 plants m^{-2} in rows with spacing of 0.1 meter between rows.

Sowing was done in the month November, between 15 to 20 November 2014 with tractor on available bed. The plants will be harvested at maturity and traits such as plant height, number of grains per spike and 1000-grains weight will be recorded on 20 randomly selected plants plot. Seed protein content will be recorded. Number of spikes per unit of area, grain yield and biological yield will be obtained by harvesting an area of 3 m^2 from the middle of each plot to avoid marginal effects. Analysis of variance will be carried out using SAS computer software packages.

(5) **Results and Discussion**

The effects of biofertilizer inoculation on grain yield, yield components and protein content of wheat has been recorded in Table. The results obtained from the variance analysis of data indicated that biofertilization had significant effects on all of the studied traits. Moreover, inoculation with biofertilizer affected significantly with number of spikes per unit of area. Furthermore, interactions between N fertilization x weed interference were not found. Biofertilizer inoculation showed significant effects on grain yield and biological yield of wheat. The symbiotic interaction between two or more-non legume wheat plants & symbiotic friendly developments of roots between two or more plants, not only boost plant nutrition but increase the number of spikes & number of grains in wheat & spikes as well as height & biological yield.

Showing the symbiotic interaction between two or more (seven plants) non-legume wheat crops & symbiotic friendly developments of roots between two or more (seven plants) plants, not only boost plant nutrition, but increase the number of spikes & number of grains in wheat's spikes as well as height & biological yield. Plant height = 120cm to 100cm, spikes M^{-2} = 600 to 650 spikes & No. of grains per spikes = 45 to 52 grains/spikes.

(6) **Plant height (P H)**

The plant height was significantly affected by biofertilizer inoculation. The highest plant height is observed in 100cm to 120cm. The minimum plant height was recorded as 90cm. Application of biofertilizer increased plant height by 20%.

(7) **Number of spike per unit of area (M^{-2})- 600 to 650 spikes**

Number of spikes m^{-2} increased with the increase of N application rate. The 600 & 650 spike were recorded in the field as per our plant populations.

(8) **Number of grains per spike (G): 45 to 52 grains/spike**

Variance analysis biofertilizer inoculation had statistically significant effects on number of grains per spike. The highest number of grains per spike is recorded 52 grain per spike – to minimum 40 grain per spike. The *Azotobacter* sp. and *Azospirillum* sp. increased the available nitrogen in the soil which could enhance the grain number. Furthermore, the highest number of grains per spike were observed.

1 000-grains weight (1 000-G W): 42 grams to 50 grams

1 000 –grains weight was significantly affected by biofertilizer inoculation. The increase of bionitrogen application rate increased significantly the weight of 1 000-grains in wheat.

Biological yield (B Y)

Biological yield of wheat also showed the same trend as grain yield. Moreover, wheat plants that were treated with biofertilizer had higher biomass than plants untreated with this inoculum. Inoculation with biofertilizer increased the biological yield about 10%.

Conclusions

In summary, the results obtained from this study clearly indicated that wheat (*Triticum aestivum* L.) yield, yield components and protein content of grains had a strong association with biofertilizer. Higher rates of biofertilizer (*Azotobacter* sp. and *Azospirillum* sp.) inoculation increased plant height, spike number per unit of area, grains number per spike, 1 000-grains weight, grain yield biological yield and grain protein content. The symbiotic interaction between two or more-non legume wheat plants & symbiotic friendly developments of roots between two or more plants, not only boost plant nutrition but increase the number of spikes & number of grains in wheat & spikes as well as height & biological yield.

Mr.Phool Singh Rathore, Mob.No. 09782260627 measuring & counting the plant height = 120 cm to 100cm. No. of grain per spikes = 45 to 52 counting no. of spikes per sq.ft in box = 60 to 65 spikes.

(9) **Introduction about quality conditions of biofertilizer**

There is increased emphasis on environmental condition & quality due to continuous use of chemical fertilizers. The integrated nutrient management i.e combined use of bio-fertilizers with organic materials such a animal manures, crop residues, green mustard & wheat spices of current crops with Gypsum ¼ftlle½, wooden Ash, Green, Black or Yellow soil & goat manuars ¼fexyh½ & blue Green Algae ¼dkb½ are alternatives and are characterized by 100% reduced input of chemical fertilizers. Biofertilizer manures are well established to be useful in fertilization of plants due to their beneficial effect on the physical, chemical & biological characteristics of sandy soil, which in turns, influence growth and increase plant height & there by production.

In recent years, bio-fertilizers the products containing living cells of different types of micro-organism are also used in integrated nutrient supply system. Bio-fertilizers can convert nutritionally important elements from unavailable to available form through biological processes leading to availability to crop yields.

Trichoderma Harzianum, a filamentous fungus is used as a biological control agent to control different soil borne plant pathogens such as Pythiam spp. rhizoctonia solani, Fusarium spp. scerotium rolfsii etc.

It was seen and demonstrated that T-harzianum induced defence responses and systematic resistance in addition to control of plant pathogens. More ever, several species of Trichoderma promoted growth and height of mustard crops. Efficient use of Trichoderma enriched bio-fertilizer will certainly increase yield, reduce soil borne pathogens and improve soil health of sandy soil.

(10) **Two bio-fertilizers enriched mustard & wheat tissues were used in present experiment**

Sources of brassicaceae (Mustard) & Triticum aestivum (Wheat) tissues & their culture Trichoderma enriched Bio-fertilizer (Bio.F)

(1) Bio F/cow manuer enriched organic mixed compost i.e Cow dung, Cow urine, Gypsum ¼ftIle½, Blue, Green Algae ¼dkb½ floating over water course or in the cannel. Black soil, Red soil, Goat's manuar ¼fexuh½, Wooden Ash & two or three Green mustard crop's complete plants with root & shoot which includes sandy soil under plants (current standing crops) were used.

(2) Bio F/suspension (Broth of T.harziamum i.e) fungal spores – suspension were grown in liquid media of Bio.f of Cow dung, Cow's urine & the 10 Kilograms of the above(1) Bio F. Materials with seven days at normal temperature. So obtained fungal spores culture was used as Bio F/suspension (Contained 3.5–6.15 x 10^6 spores/ml approximately).

Application of Biofertilizer

In case of wheat, Bio F/ suspension @25 ml was applied in each row after 10 days emergence of seedling by hand sprayer. On the other hand, Bio F/compost @25g were dropped in each row after 20 days of seedling & repeated both process after each of above process – in next 50 days & 70 days of seedling.

(11) **(A) Living Triticum aestivum – wheat cereal crop's Tissues As Inhibitors Of Nitrification in sandy soil. Living Brassicaceae Tissues as Inhibitors of Nitrification in Soil**

Triticum aestivum crops often produce an unexplained increase in plant-available soil N possibly related to bioactive compounds produced from glucosinolates present in the tissues. Our objective was to determine if glucosinolate-containing tissues of mustard & wheat inhibit nitrification, thereby potentially explaining this observation. Ammonium, NO(2)(-), and NO(3)(-) N were measured in soils amended with Brassicaceae & Triticum aestivum (Lsatis tinctoria L., Brassica napus L., Brassica juncea L., and Sinapis alba L.) tissues containing different glucosinolate types and concentrations of Brassicaceae & wheat samples. There was greater accumulation of NH(4)(+) N in soils amended with tissues containing high glucosinolate concentrations as compared to soils amended with tissues containing no or low glucosinolate concentrations. Nitrite N was detected only in soils amended with Brassicaceae & wheat tissues having the highest glucosinolate concentrations. The positive correlation of both NH(4)(+) and NO(2)(-) N accumulation with the glucosinolate concentration indicates the participation of glucosinolate hydrolysis products in nitrification inhibition. So biofertilizer having Brassicaceae & Triticum aestivum (wheat) plants growing in the field were used as a cyclist in making biofertilizer.

There is a critical need to investigate how land application of dedicated biofuel of wheat & mustard meals affects soil ecosystems. In this study, mustard & wheat tissues were added to soil. Both the type of amendment and application rate affected soil organic C, total C & N, and C & N mineralization. The wheat & mustard biological greatly impacted microbial community composition, appearing to select for specific fungal populations. The potential varying impacts of tissues on soil ecosystems should be considered when developing recommendations for land.

(12) **Plant growth promoting bacteria in Wheat Crop**

The interaction of living crop plants & tissues with soil microbes is an important area of study for boosting crop nutrition. The symbiotic interaction between leguminous plants and Rhizobia is well known, where the bacteria colonising root nodules supplies biologically fixed N in return for a carbon source, and allows for very low inputs of N fertiliser. It has been of interest to find equivalent plant growth promoting rhizobacteria (PGPR) that can interact with major non-leguminous cereal crops to boost plant nutrition and permit complete reductions in inputs of chemical fertiliser. The symbiotic interaction between two or more-non legume wheat plants & symbiotic friendly developments of roots between two or more plants, not only boost plant nutrition but increase the number of spikes & number of grains in wheat & spikes as well as height & biological yield.

(13) The naturally occurring rhizobia, such as those isolated from the root nodules of non-legume wheat, and from stem nodules of tropical legume species, are able to enter the root systems wheat by 'crack entry'. This 'crack entry' of rhizobia occurs where lateral roots emerge through the root cortex, resulting in the penetration of rhizobia both between and into cells of the cortex of young emerging lateral roots which, as a result, become thicker and shortened. Interacted oxygen tolerant *Azorhizobium caulinodans*, isolated from stem nodules of the tropical legume *Sesbania rostrata*, and also oxygen tolerant *Rhizobium* isolated from stem nodules of the tropical legume *Aeschynomene indica*, with the root systems of wheat. This interaction resulted in the development of plants with short, thickened lateral roots, containing intercellular and intracellular rhizobia in cells of the cortex, interspersed amongst normally developing lateral roots. These plants possessed significant nitrogen fixation activity as determined using ethylene production in the acetylene reduction assay.

Current soil management strategies are mainly dependent on inorganic chemical-based fertilizers, which caused a serious threat to human health and environment. The exploitation of beneficial microbes as a biofertilizer has become paramount importance in agriculture sector for their potential role in food safety and sustainable crop production. The eco-friendly approaches inspire a wide range of application of plant growth promoting rhizobacteria (PGPRs), endo- and ectomycorrhizal fungi, cyanobacteria and many other useful microscopic organisms led to improved nutrient uptake, plant growth and plant tolerance to abiotic and biotic stress. The present review highlighted biofertilizers mediated crops functional traits such as plant growth and productivity, nutrient profile, plant defense and protection with special emphasis to its function to trigger various growth- and defense-related genes in signaling network of cellular pathways to cause cellular response and thereby crop improvement.

Organic farming is mostly dependent on the natural microflora of the soil which constitutes all kinds of useful bacteria and fungi including the arbuscular mycorrhiza fungi (AMF) called plant growth promoting rhizobacteria (PGPR). Biofertilizers keep the soil environment rich in all kinds of micro- and macro-nutrients via nitrogen fixation, phosphate and potassium solubalisation or mineralization, release of plant growth regulating substances, production of antibiotics and biodegradation of organic matter in the soil. When biofertilizers are applied as seed or soil inoculants, they multiply and participate in nutrient cycling and benefit crop productivity. In general, 60% to 90% of the total applied fertilizer is lost and the remaining 10% to 40% is taken up by plants. In this regard, microbial inoculants have paramount significance in integrated nutrient management systems to sustain agricultural productivity and healthy environment. The PGPR or co-inoculants of PGPR and AMF can advance the nutrient use efficiency of fertilizers.

In the biofertilizer technology, *Rhizobium-legume* is most common and widely used in different countries. Recently, it is also found that rhizobia can make an association with graminaceous plants such as rice, wheat, maize, barley millets and other cereals some time as endophytic without forming any nodule-like structure or causing any disease symptoms. Increasing the ability of rhizobia in biofertilizer, crop enhancing activity in nonlegumes especially cereal grains would be a useful technology for increased crop yields among resource-poor farmers. Recent findings showed both more crop enhancing and biofertilizer attributes in cereal crops due to rhizobial inoculation. In addition, plant nutrients like P, K, Ca, Mg and even Fe accumulation were also observed. Therefore, further research in this area will be able to develop a sustainable biofertilizer technology for greater and environment friendly cereal production system, between more numbers of Target population of wheat. The 600 & 650 plant's m^{-2} in rows with 0.1 meter between two rows is most ideal to get the bumper production of wheat.

How do mycorrhizal fungi increase nutrient uptake?

These fungi increase the surface absorbing area of roots 10 to 100x thereby greatly improving the ability of the plants to utilize the soil resource. Estimates of amounts of mycorrhizal filaments present in soil associated with plants are astonishing. Several miles of fungal filaments can be present in less than a thimbleful of soil! But mycorrhizal fungi increase nutrient uptake not only by increasing the surface absorbing area of roots, they also release powerful chemicals into the soil that dissolve hard to capture nutrients such as phosphorous , iron and other "tightly bound" soil nutrients.

This extraction process is particularly important in plant nutrition and explains why non-mycorrhizal plants require high levels of fertility to maintain their health. Mycorrhizal fungi form an intricate web that captures and assimilates nutrients, thus conserving the nutrient capital in soils. In non mycorrhizal conditions much of this fertility is wasted or lost from the system.

(14) **What other activities do mycorrhizal fungi do?**

Mycorrhzial fungi are involved with a wide variety of other activities that benefit plant establishment and growth. The same extensive network of fungal filaments important to nutrient uptake is also important in water uptake and storage. In non-irrigated conditions, mycorrhizal plants are under far less drought stress compared to non-mycorrhizal plants.

Mycorrhizal fungi also improve soil structure. Mycorrhizal filaments produce humic compounds and organic "glues" (extracellular polysaccharides) that bind soils into aggregates and improves soil porosity. Soil porosity and soil structure positively influence the growth of plants by promoting aeration, water movement into soil, root growth, and distribution. In sandy or compacted soils the ability of mycorrhizal fungi to promote soil structure may be more important than the seeking out of nutrients.

(15) **Don't tillage soils already contain mycorrhizal fungi? (No tillage or minimum tillage)**

Undisturbed soils are full of beneficial soil organisms including mycorrhizal fungi. Research indicates, however, many common practices can degrade the mycorrhiza-forming potential of soil. Tillage, fertilization, removal of topsoil, erosion, site preparation, road and home construction, fumigation, invasion of non-native plants, and leaving soils bare are some of the activities that can reduce or eliminate these beneficial soil fungi. Reintroducing mycorrhizal fungi in areas where they have been depleted can dramatically improve plant establishment and growth.

(16) **What is Biofertilizers**

1) Biofertilizers are products containing living cells of different types of microorganisms which when, applied to seed, plant surface or soil, colonize the rhizosphere or the interior of the plant and promotes growth by converting nutritionally important elements (nitrogen, phosphorus) from unavailable to available form through biological process such as nitrogen fixation and solubilization of rock phosphate. Beneficial microorganisms in biofertilizers accelerate and improve plant growth and protect plants from pests and diseases.

2) Bio-fertilizer can't efficiently work without enough mineral elements in the sandy soil, if there is no enough mineral elements or the soil is poor the bio-fertilizer is worthless. Remember that, inoculated micro-organisms in the bio-fertilizers convert the mineral elements from invalid to valid form

3) Biofertilizer is a substance which contains living microorganisms which, when applied to seed, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant. Bio-fertilizers add nutrients through the natural processes of nitrogen fixation, solubilizing phosphorus, and stimulating plant growth through the synthesis of growth-promoting substances. Organic fertilizers are naturally occurring fertilizers (e.g. compost, manure). The majority of nitrogen-supplying organic fertilizers contain insoluble nitrogen and act as a slow-release fertilizer. By their nature, organic fertilizers increase physical and biological nutrient storage mechanisms in soils, mitigating risks of over-fertilization. Organic fertilizer nutrient content, solubility, and nutrient release rates are typically much lower than mineral (inorganic) fertilizer.

(17) **Crop development with Biofertilizer only in sand soil of their desert of Bikaner (Rajasthan)**

Wheat normally needs between 110 and 130 days between sowing and harvesting, depending upon climate, seed type, and soil conditions (winter wheat lies dormant during a winter freeze). Optimal crop management requires that the farmer have a detailed understanding of each stage of development in the growing plants. In particular,
spring fertilizers, herbicides, fungicides,
and growth regulators are typically not applied at any specific stages of plant development. For example, it is currently recommended that the second application of nitrogen is best done when the ear (not visible at this stage) is about 1 cm in size. Knowledge of stages is also important to identify periods of higher risk from the climate. For example, pollen formation from the mother cell, and the stages between an thesis and maturity are susceptible to high temperatures, and this adverse effect is made worse by water stress. Farmers also benefit from knowing when the 'flag leaf' (last leaf) appears, as this leaf represents about 75% of photosynthesis reactions during the grain

filling period, and so should be preserved from disease or insect attacks to ensure a good yield by biofertilizer only.

Standing crops: Height = 120cm to 100cm & No. of spikes per sq.ft. = 60 to 65 spikes

(A) **Winter cereal growth stages (L=leaf, T=tiller)**

See winter cereal growth stages figure.

1. **Three leaf stage**

Three leaves have unfolded (L), the fourth leaf is present, yet to fully expand. A leaf is not fully emerged until the point of leaf base attachment with the leaf sheath (ligule and auricles) is clearly visible.

2. **Start of tillering**

Tillers come from buds at the base of the lower leaves, where the leaf sheath joins a node on the true stem in the base of the young plant at, or just below ground level. The first tiller (T) appears between a lower leaf and the main shoot. Usually 3-4 leaves are present.

3. **Early tillering**

Tillers continue to appear between the lower leaves and the main shoot, that now has 4-5 fully emerged leaves, plus one or more tillers.

4. **Mid tillering**

The main shoot has 5-6 fully emerged leaves plus one or more tillers. New leaves continue to be produced and the main stem and tillers increase in size as the leaf blades and sheaths expand and elongate.

5. **Late tillering - start of jointing**

When the main tiller is mature, the growing point on the true stem deep in the base of the plant stops producing leaves and develops the young seed head at its apex. Under normal growing conditions, this occurs when the main shoot has between 5-7 developed leaves.

6. **Jointing**

When the reproductive (noding or jointing) stage has begun, small hard swellings (nodes) develop on the stem at the point of leaf sheath attachment. Its start may be first detected by the appearance or feel of a node in the stem slightly above the ground level. At this early stage the first joint can be more easily seen if the stem is dissected along its length.

The stem between the nodes elongates rapidly, starting from the bottom node, pushing the seed head upwards. The developing head may be seen by dissecting a stem.

7. **Early boot stage**

A visible swelling of the head within the sheath of the flag leaf can be seen at the top of the main stem.

There are many wheat diseases, mainly caused by fungi, bacteria, and viruses. Plant breeding to develop new disease-resistant varieties, and sound crop management practices are important for preventing disease. Fungicides, used to prevent the significant crop losses from fungal disease, can be a significant variable cost in wheat production. Estimates of the amount of wheat production lost owing to plant diseases vary between 10–25%. A wide range of organisms infect wheat, of which the most important are viruses and fungi. But using biofertilizer at different stages does not effect any diseases in our field.

Pests: No pests has been used in this study. Only biofertilizer was used.

(18) **Result & Discussion & Impact of Production in India**

Impact of Tissue – enriched Bio-fertilizer (BioF) on wheat crop

Living Tissue & its culture enriched Bio-fertilizer did increase plant height, number of grains per plant in wheat resulted in the higher numbers spikes.

The present results showed that the above BioF used, significantly increased the number of spikes cluster, number of grains per plant of wheat & increasing & encouraging impact of grains length & seed number of wheat & there by increases the yield of crops by 60% more than normal crops yield.

(19) **Location of Testing the fields**

Cultivation in sandy soil field at:

(a) Madhav Diggi village of Khajuwala Tehsil; located at 92KM of Bikaner–Khajuwala Road, Bikaner (Rajasthan) contact person: Gulab Sonar, Mob.No.: 09928329063

(b) Sattasar village at RD 615/616 of main I.G.N.P canal; located at 72KM of Bikaner–Chhatargarh Road, Bikaner (Rajasthan) contact person: Ghewar Ram, Mob.No.: 09001045580

(c) Total land cultivated at both location is approximately 250 Bigha (165ft x 165ft) = 100 hectare – including chickpea/gram ¼puk½

(20) **Yield of Wheat estimated**

The yield of wheat will be approximately 20 quintals per Bhigha (165ft x 165ft) i.e more than 60% of normal crops in India as per estimate. That is approximately 5.0 Ton/ha in sandy soil. Which is impossible at present in the adverse climatic conditions & environment in Bikaner, Rajasthan.

(21) **Contact person for more detail for pre-appointment**

Name: Phool Singh Rathore, Mob.No.: 09782260627

Note: **About chickpea/gram ¼puk½ & its production: The technical statistical & detail will be published separately. The production of chickpea ¼puk½ is also being supposed to be double i.e. 8 quintal/Bigha (165ft x 165ft)**

Contact Details

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