

*Assessing the Impact of Phosphorus 30C and 200C Potencies on the*

*Growth and Yield of  
~~Pisumsativum~~ ~~isumsativum~~ (Green Pea)*

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**ABSTRACT:**

*Pisum* ~~Sativum~~ is one of the commonest crops grown in India. Therefore, increasing the yield of green pea plants without harming the soil with chemicals ~~is~~ are important. In places where there is deficiency of phosphorus in soil resulted in decreased production of green pea plants. The parameters were analysed by using statistical tool ANOVA test. The ~~c~~ Conclusion derived from the study was Phosphorus 200C ~~has~~ significantly influenced in the growth and yield of *Pisum* ~~Sativum~~ plant in regards to Height of the plant, Number of Pods per Plant, Length of the Pod, and Number of Seeds per Pod. ~~My study is to know the effect of homeopathic medicine as a fertilizer to plants.~~

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**KEYWORDS:** *Pisum* ~~Sativum~~, Phosphorus, ~~Agrohomo~~ ~~opathy~~.

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**INTRODUCTION:**

Vegetable pea (*Pisum sativum*) is an important vegetable belonging to the family Leguminosae<sup>(1)</sup>. In India 49% of production comes from Uttar Pradesh<sup>(2)</sup>. Green peas are rich sources of proteins and they also contain different nutrients and minerals<sup>(1)</sup>. Like lentils peas are also good sources of dietary phosphorus<sup>(3)</sup>. Green peas are important part of diet due to presence of carbohydrates, proteins, vitamins, minerals and other nutrients. Green peas are high in fiber and protein and these are also a powerhouse of vitamins, minerals, antioxidants and phytonutrients. They lower cholesterol and manage blood sugar levels<sup>(4)</sup>.

Phosphorus is needed to promote the development of extensive root systems and vigorous seedlings in case of pea plants. Application of nitrogen and phosphorus to pea crop usually results in increased pod and seed yields<sup>(5)</sup>. In peas increasing the phosphorus levels, generally increase the plant height, number of pods per plant, pod length, number of seeds per pod and pod weight<sup>(6)</sup>. Phosphorus is essential for seed production, it not only enhances the root growth but also promotes early plant maturity. Fertilizers are used to supply pea plant with

nitrogen, phosphorus and potassium ratio of 5%, 10% and 10% respectively. Higher amounts of phosphorus and potassium will favor more yield production.

Phosphorus is an important element for enzyme binding in Krebs' cycle<sup>(7)</sup>. Its deficiency shows discoloration of leaves and stems, stunted growth, reduced quantity and quality of seeds.

Cultivation of pea is highly profitable and attractive to the farmers for its short duration and high price. It takes about 55 to 75 days from sowing for its green pod harvest and 75 to 100 days for matured seed harvest.

Compost improves the soil proportion and finally the crop yield, but in view of its inadequacy and low availability of nutrients productivity per unit area is poor. In such cases supplementing phosphorus through inorganic sources thus plays a vital role in increasing the yield of this crop. Therefore, the present investigation was done to undertake the study of the effect of phosphorus on *Pisum sativum*.

Agro-homoeopathy is an area in homoeopathic practice in which homoeopathic medicines are used to increase the yield, to control infections and pests, to treat plants etc. It is cost effective and an alternate for chemical fertilizers and thus helps in increasing the yield and farmers' income. This kind of fusing homoeopathic medicines for plants was first mentioned in the writings of Dr. Baron Von Boenninghausen<sup>(8)</sup>

*Pisum sativum* (Family: Fabaceae), also known as green pea or garden pea, has long been an important diet due to its content of fiber, protein, starch, trace elements, and many phytochemical substances. It has been shown to possess antibacterial, antidiabetic, antifungal, anti-inflammatory, anti-hypercholesterolemia, and antioxidant activities and also shown anticancer property. Its non-nutritive biologically active components include alkaloids, flavonoids, glycosides, isoflavones, phenols, phytosterols, phytic acid, protease inhibitors, saponins, and tannins. This plant is rich in apigenin, hydroxybenzoic, hydroxycinnamic, luteolin, and quercetin, all of which have been reported to contribute to its remedial properties including anticarcinogenesis property. Based on established literature on the anticancer property of *P. sativum* and possible mode of action, this review article has focused to demonstrate that *P. sativum* could be further explored for the development of anticancer treatment. [state the reference for this above content on \*Pisum sativum\*](#)

Legume or pulse is one of the traditional medicines used globally because it has the amount of nutritional substances and has the efficiency of therapeutic treatments. Legumes include

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beans, grains, and peas as well as alfalfa, carob, clover, coplayer, fenugreek, indigo, lentil, licorice, lupin, mesquite, natto, soybean, peanut, rosewood, and tamarind are the members of the Fabaceae family. Their nutritional values of legumes are low fat, high protein, dietary fiber, and various of micronutrients and phytochemical substances which exhibit the medicinal properties, especially anticancer property. Peas are one of the major food legumes that can grow in different regions, and it ranks the fourth in world food legume production next to soybean, peanut, and dry bean. Seed and sprout of pea have become increasingly consumed because people concern about their health problem by changing dietary habits. The present review explores scientific evidence to provide updated information about the properties of green pea or garden pea (*Pisum sativum*), one of the anticancer plants that is being investigated for its mechanism. The taxonomy of *P. sativum* is in the Kingdom (*Plantae*); Subkingdom (*Viridiplantae*); Infrakingdom (*Streptophyta*); Super division (*Embryophyta*); Division (*Tracheophyta*); Subdivision (*Spermatophytina*); Class (*Magnoliopsida*); Superorder (*Rosanae*); Order (*Fabales*); Family (*Fabaceae*); Genus (*Pisum*); and Species (*P. sativum*). [reference please!!](#)

#### **PHYTOCHEMICAL SUBSTANCES:**

Active phytochemical substances of *P. sativum* are as follows: Asparaginase; flavonoids including apigenin, daidzein, genistein, and kaempferol; lectin; phenolic compounds including caffeic, catechin, coumaric acids, gentilic acids, ferulic, protocatechuic, and vanillic acids; The pisatin and an allelopathic active substances; proanthocyanidin; saponins; steroid phytohormone including brassinosteroid; and tannins. [State the reference for this information or statement above!!](#)

#### **TRADITIONAL USES:-**

*P. sativum* can be consumed in raw form as well as cooked or frozen form. The various bioactive compounds' current uses or phytochemical properties of *P. sativum* from several literature reviews are antibacterial, anti-*Helicobacter pylori*, anticancer, antidiabetic, antifungal, anti-inflammatory, antilipidemic, and antioxidant activities. Moreover, it can act as insecticidal activity.

#### **PHYTOCHEMICAL SUBSTANCES WHICH ACT AS ANTICANCER ACTIVITY:-**

Isoflavones worked as phytoestrogens and could inhibit tumorigenesis both *in vitro* and *in vivo* studies. Their mechanisms were DNA repair, induction of apoptosis, cell proliferation, migration, and invasion.

There are the most abundant lectin proteins in several legume tree barks, and they have great potential as anti-tumor and anti-cancer properties. Cytotoxicity or tumour inhibition mechanisms of lectins to various tumour cell lines such as skin, liver, bile duct, and bone cell lines

A number of legumes contain saponins such as soybean, chickpea, peanut, and lentil, which have reported to exhibit anti-cancer activities. Several studies suggest that legume saponins may possess anti-cancer activities in melanoma cell, colon cancer, and cervical cancer. The mechanism of suppressing the metastatic of cancer was mentioned by Chang *et al.* using sialyltransferase inhibition activity of saponin on the cell surface. The other mechanism was saponin regulation of the apoptosis pathway enzymes, leading to programmed cell death of cancer cells.<sup>(15)</sup>

Pea (*Pisum sativum* L.) is a popular pulse crop of India. Pea (*Pisum sativum* L.) is a popular pulse crop of India and belongs to family Leguminosae. It is a native of Southern Asia, was among the first crop cultivated by man. Pea is a cold season crop in many parts of the world. There are two types of cultivated pea, the garden pea and the field pea. Garden peas are harvested in a immature condition to be cooked as a green pea, a delicious dish or uncooked vegetable. It is also used for dehydration (or sundried), canning and freezing. Pulses are good sources of proteins for a majority of the population in India. Pulses contribute 11% of the total intake of proteins in India. About 89% consume pulses at least once a week. Pulses are not only rich in protein but also have essential amino acid compared to cereal protein. They provide energy to the tune of 372 Kcal/100g. They also contain other nutrients such as C, Fe and vitamins viz.,  $\beta$ -carotene, thiamine, riboflavin and niacin. [Where is the reference???](#)

In Manipur, various types of peas are grown and each type has its unique character and taste. Among them, Makhyatmubi is one of the most popular local cultivars under Garden pea (*Pisum sativum* L. subsp. *hortense*). It is consumed as green pods as well as grain for preparation of different curries along with potato, tomato or other some other vegetables and meats. Tender shoots are ripped for the preparation of salad and boil. Singju is another Manipuri (Meitei) famous item; it's a snack for us. Singju is more like a vegetable salad made from mixing of various vegetables indigenous to Manipur like hawaimaton (tender shoot), roasted pea seed, 'tunikkhok

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'(buckwheat) and other vegetables. The dry seeds are harvested for the purpose of seed production. After harvesting the remaining stubs are burnt and collected as ash. The ash is diluted in water and then, it is filtered in a strainer. The filtrate is used for the preparation of special traditional dish known as "utti" (Manipuri ethnic cuisine). Nowadays, people started using [bicarbonate of soda](#) [Sodium Bicarbonate](#) (baking soda) instead of peaplant ash. In addition, it is also grown both in hills and parts of the plain areas of Manipur.

Optimum spacing is necessary to obtain maximum yield in any crop by reducing the competition among the plants for light, nutrient, moisture, etc. It depends on size of plant, elasticity, nature of the plant, capacity to reach optimum leaf area at an early date and seed rate used. Optimum spacing for any crop varies considerably due to environment under which it is grown. It is not possible to recommend a generalized optimum spacing since the crop is grown in different seasons with different management practices in different soil types. So, optimum spacing differs depending on the environmental conditions and plant type. But till date no research work is conducted in this regard for the said variety. Therefore, keeping in view the above aspects the present investigation "Effect of spacing on growth and green pod yield of pea (*Pisum sativum* L. subsp. hortense) local cultivar Makhyatmubi" is done.<sup>(20)</sup>

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Growth stimulation of dwarf peas (*Pisum sativum* L.) through homeopathic potencies of plant growth substances. Efficacy of higher homeopathic potencies is controversial. Universally accepted specific detection assays for homeopathic dilutions do not exist. Basic research has to develop a spectrum of standardized tools to investigate the mode of action and nature of homeopathic potencies. Green Pea seed (*Pisum sativum* L.) is immersed for 24 hours in homeopathic potency or control solutions for soaking. Plants germinate and grow in a standard cultivation substrate under controlled environmental conditions. Shoot length is measured 14 days after planting. A screening of homeopathic potencies (12x-30x) of four different plant growth substances revealed biological activity of certain potency levels of gibberellin and kinetin ( $p < 0.05$ ). Growth stimulation through gibberellin 17x (5x10<sup>-18</sup>M) was assessed in six independent replications; results confirmed those of the screening ( $p < 0.05$ ). The effect of gibberellin 17x seemed to weaken during the course of the experiments.<sup>(16)</sup>

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Red soil is known as omnibus soil. The presence of ferric oxide gives a red color to this soil. This soil is mainly found in the eastern and southern parts of Orissa, Chhattisgarh, Deccan plateau and southern parts of middle Gangetic plain. wheat, pulses, tobacco, oilseeds, potatoes are the

major crops which are grown in red soil. And it has lesser concentration of nitrogen, phosphorus, potassium and organic matter.<sup>(18)</sup>

Green peas grow well in red soil that has high percentage of iron oxide and is porous in nature. ~~pH~~ value of it ranges between 6.6 and 8.0. Many soils, from sand to heavy clay, are good for peas as long as you have well drained soil. Peas grow better in soil with a pH between 6-7.5.<sup>(17)</sup>

Pea (*Pisum sativum* L.) requires little water to grow, and therefore, provides an important pulse crop in dryland cropping systems. Pea supplies protein and fibre for human and livestock diets, particularly for vegetarian people in developing countries with limited protein sources and acts as a starch source widely used in processing noodles. From a soil fertility perspective, pea fixes more N from the atmosphere than lentil (*Lens culinaris* L.) and cowpea (*Vigna unguiculata* L.) (Miller et al., 2003b) and needs little P or K fertilizer to grow than other legumes.

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In these semi-arid regions of the northern Great Plains, USA, traditional cropping systems that include conventional tillage with spring wheat (*Triticum aestivum* L.)–fallow have not only degraded soil quality by increasing soil erosion and reducing organic matter, but also decreased annualized yield. To replace fallow and enhance cropping intensification, pea has been increasingly grown in these regions in rotation with cereals. The rotation not only increased crop yields, but also reduced the risk of crop failure, enhanced biodiversity, and increased farmer income. As a result, since 1970, the pea area has steadily increased, whereas fallow area decreased.

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In addition to other crop production benefits, pea improves soil and environmental quality. Pea residue increases N supply due to higher N concentration from N fixation or lower C/N ratio than non-legumes, which increases N mineralization, thereby reducing N fertilization rates, and enhances soil water availability to succeeding crops due to its lower water requirement than non-legume crops. Pea reduces the weed, pest, and disease pressure; increases P, K, and S availability due to their greater concentration than other crops; improves soil structure; and mitigates greenhouse gas emissions compared with continuous non-legume crops.

Recommendations of improved crop cultivars in a region are usually based on their growth performance and yield over a wider range of soil and climatic conditions. These processes often fail to account for management practices that may enhance crop production. With limited global land resources, food production must be increased by twice as much to meet the demand of 9 billion people by 2050. This can be achieved by including management practices during the

recommendation of crop cultivars, called the genetics × environment × management interaction, which accounts for the efficient utilization of soil water and nutrients and reduces weed and pest infections, thereby increasing crop yields. The process will also result in resilient and sustainable production of crops in a changing climate.

Pulses, including peas, have long been important components of the human diet due to their content of starch, protein and other nutrients. More recently, the health benefits other than nutrition associated with pulse consumption have attracted much interest. The focus of the present review paper is the demonstrated and potential health benefits associated with the consumption of peas, *Pisum sativum* L., specifically green and yellow cotyledon dry peas, also known as smooth pea or field peas. These health benefits derive mainly from the concentration and properties of starch, protein, fibre, vitamins, minerals and phytochemicals in peas. Fibre from the seed coat and the cell walls of the cotyledon contributes to gastrointestinal function and health, and reduces the digestibility of starch in peas. The intermediate amylose content of pea starch also contributes to its lower glycaemic index and reduced starch digestibility. Pea protein, when hydrolysed, may yield peptides with bioactivities, including angiotensin I-converting enzyme inhibitor activity and antioxidant activity. The vitamin and mineral contents of peas may play important roles in the prevention of deficiency-related diseases, specifically those related to deficiencies of Se or folate. Peas contain a variety of phytochemicals once thought of only as anti-nutritive factors. These include polyphenolics, in coloured seed coat types in particular, which may have antioxidant and anticarcinogenic activity, saponins which may exhibit hypo-cholesterolaemic and anticarcinogenic activity, and galactose oligosaccharides which may exert beneficial prebiotic effects in the large intestine<sup>(24)</sup>

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Drought stress has become an important factor affecting global food production. Screening and breeding new varieties of peas (*Pisum sativum* L.) for drought-tolerant is of critical importance to ensure sustainable agricultural production and global food security. Germination rate and germination index are important indicators of seed germination vigor, and the level of germination vigor of pea seeds directly affects their yield and quality. The traditional manual germination detection can hardly meet the demand of full-time sequence non-destructive detection. We propose YOLOv8-Peas, an improved YOLOv8-based method for the detection of pea germination vigour.<sup>(25)</sup>

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Genistein is a naturally occurring isoflavone found mainly in soybean, but also green peas, legumes, and peanuts. Genistein is found to pass through the blood-brain barrier and possess a neuroprotective effect. In this review, we discuss studies in support of these actions and the underlying biological mechanisms. Together, these data indicate that genistein may hold neuroprotective effects in either delaying the onset or relieving the symptoms of neurodegenerative disease.<sup>(26)</sup>

The present study aims to improve the availability of P to plants by applying a readily available source of P fertilizer in combination with foliar biostimulant applications for direct absorption by German chamomile plants. The results suggested that the combination of a synthetic P nutrient source and biostimulants can positively affect plant growth, floweryield, and EO composition. According to research, optimal utilization of P fertilizer and biostimulants improved the performance of German chamomile concerning flower production, biomass of flowers, and EO yield. The present research suggested that the utilization of P fertilizers and plant-based biostimulants is efficient for crop improvement in acidic soils, thus contributing to increased yield goal of growers.<sup>(27)</sup>

The systemic agro-homeopathic approach considers the farm as a single organism, an agroecosystem of living and non-living elements, which establishes a dense network of interactions. Its purpose is to strengthen and intensify the relationships among the organisms to create a stronger and healthier agroecosystem, involving all the organisms within the agroecosystem. To fulfill this aim, the described approach allows one to control and manage the agricultural processes through the application of highly diluted and dynamized natural substances. The latter might restore the equilibrium in the agroecosystem by stimulating the natural resistance already present in the agrarian system. The identification of the correct mineral remedy, through the biotypes and pathogenesis levels, could allow one to act on the chronic condition of the agroecosystem (imbalance in plant primary metabolism or cellular levels), whereas, the identification of plant/animal homeopathic remedy, based on the principle of metabolic similarity, might allow the management of the acute conditions (phytopathological diseases).

Till now, the systemic agro-homeopathic approach has been adopted by some farmers in Europe, particularly in Italy, for about six years and it is increasing interest, especially among organic producers. To date, several observations have been reported by farmers (personal communications), providing positive and encouraging perspectives, but some rigorous scientific

experimentation at the farm level is needed to validate such results. If statistical data from field trials were to confirm the observations made so far, the systemic agro-homeopathic approach could represent an agroecological production model with a very low energy impact. Additionally, this approach could be in line with the current European community orientation (European Green Deal), which aims to promote a type of sustainable agriculture. In this context, systemic agro-homeopathy would meet the three pillars of sustainability: (1) economic, due to the very low use of raw materials; (2) environmental, by avoiding the use of chemical substances such as fertilizers, pesticides, etc.; and (3) social, with the production of healthy, safe, and high-quality food.<sup>(28)</sup>

### **PHOSPHORUS:-**

Phosphorus in homeopathy is prepared from the red amorphous phosphorus. The process of trituration helps to extract the medicinal properties of red amorphous phosphorus. It is used for treating a large variety of disease conditions without any side effects like anxiety, fears, hair-fall, dandruff, cough, bronchitis, pneumonia, nosebleeding, gastritis, glaucoma, hoarse voice and excessive bleeding. It is suited especially to tall, slender, narrow chested persons, who have fair skin, blonde or red hair, and delicate eyelashes. Nervousness and sensitiveness in nature are marked. Adapted to young people, who grow too rapidly and tend to stoop, and persons who have a tendency to bleed easily.

Phosphorus improves the general characteristics in plants and results in the production of larger stem diameter, with the application of this medicine. Phosphorus was absorbed faster by the plant tissues, which caused a greater growth, leaf development, and fruit size besides favoring the concentration of anthocyanins and promoting a greater photosynthetic activity. Phosphorus in homeopathy is meant to add dynamism to life.



**Fig: 01-PHOSPHORUS RAW**

**AIM:**

□ Know the efficacy of Phosphorus 30 and 200 on growth and yield of Green Peas.

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**OBJECTIVES:**

1. To know the effectiveness of Homoeopathy in plant culture.

2. To know the efficacy of Phosphorus 30 and 200 on growth and yield of Green Peas.

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**REVIEW OF LITERATURE:-**

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1. Two field experiments were conducted to evaluate the effects of phosphorus level and Agrosol treatment on pea yield, quantity and quality under Drip irrigation system. The combination between phosphorus at  $80 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$  and Agrosol at rate  $6 \text{ mg L}^{-1}$  gave the highest growth and production as well as mineral composition (N, P, K, Fe, Mn & Zn) and protein content compared to other treatments. Agrosol fertilizer decreased the soil pH and increased the availability of phosphorus and micronutrients<sup>(11)</sup>.
2. <sup>(1)</sup>Sanakhan and Faizan Aman research article on growth and yield response of pea cultivar to phosphorus fertilization concluded that the application of phosphorus significantly increased the growth and yield of peas, when phosphorus is applied at the rate of  $90 \text{ kg ha}^{-1}$ .
3. Jakir Hussain and Poonam Kashyap conducted experiments to examine the effect of phosphorus on pea (*Pisum sativum*) Arkel and Azad P-1 concluded that the plants receiving high dose of phosphorus along with N & K resulted in higher vegetative growth while optimum doses of phosphorus resulted in reproductive growth in terms of higher pod yield, pod weight, pod length, number of grains and number of pods. Thus, pea variety Azad P-1 with phosphorus application was found to be appropriate for western plain zones of Uttar Pradesh in terms of growth parameters and hence

- suggested its suitability for inclusion as a main crop or intercrop in developing horticulture<sup>(1)</sup>.
4. Hala Kandil and Nadia Gad conducted experiments to study the effect of phosphorus levels and molybdenum rates on two varieties of common beans. The obtained results indicate that growth and yield parameters were significantly influenced by the combined effect of phosphorus and molybdenum. Phosphorus levels significantly increased macro and micronutrients in the presence/absence of Mo fertilizer<sup>(12)</sup>.
  5. L Somendro Singh and PK Singh research article on two field experiments applying different liming materials and phosphorus to evaluate their efficacy on growth, yield attributes and yield of Soybean (Glycine max). The application of liming material with  $80 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$  was found to be beneficial for increasing growth, yield of grain and stover of Soybean<sup>(13)</sup>.
  6. POchola and Jacob Omollo published an article showing the effect of residual phosphorus on yield and quality of sugarcane. Their experiments suggested that sugarcane variety N14, KEN83-737 and EAK73-335 may be efficient in P uptake in P uptake soils. The study concludes that P dynamics vary with soil types and therefore may influence P fertilizer management for sugarcane production<sup>(14)</sup>.
  7. Tim Jager, Claudia Scherr, Devika Shah, Vera Majewsky published an article on the use of plant-based bioassays in homeopathic basic research stating that plant models appear to be a useful approach for investigating basic research questions relating to homeopathic preparations.<sup>(19)</sup>
  8. Kshetrimayum Manishwari Devi, M Manolata Chanu, Tabuiliu Abonmai and MS Singh, published an article stating the Effect of spacing on growth and green pod yield of pea (*Pisum sativum* L. subsp. *Hortense*) local cultivar Makhyat mubi.
  9. Abdellatif Yousif Idris, published an article to show the effect of seeds size and plant spacing on yield and Yield components of Faba Bean (*Vicia faba* L.). A field experiment was conducted in the Demonstration Farm of the Faculty of Agriculture, University of Khartoum, at Shambat. The objectives of the study were to investigate the effect of seeds size and plant spacing on yield and yield components of faba bean (*Vicia faba* L.) cultivar Kabkabia. The treatments consisted of four seed size categories (small, medium, large and ungraded bulk) and three plant spacing of (10,

20, and 30 cm) between holes. The treatments were laid in a factorial experiment in Complete Randomized Block Design (CRBD) with four replications. Increasing plant spacing increased the number of pods per plant, pods per main stem, and consequently gave the highest seed yield. Seed size had no significant effect on yield and other investigated characters.<sup>(21)</sup>

10. Hamed Abou-Aly, Rasha El-Meihy, Mohamed T. El-Saadon conducted an experiment on Improvement of Growth and Yield of Pea Plants Using Integrated Fertilization Management and conducted two field experiments were carried out during two successive winter seasons at 2013 and 2014, in a private farm at Abu-Hammad area, Sharkia Governorate, Egypt, to evaluate the integrated fertilization management, i.e., chemical fertilization (NPK), biofertilization (*Rhizobium leguminosarum* by *viciae*, *Glomus bagyarajii*, *Bacillus circulans*) with or without foliar applications of yeast extract (*Saccharomyces cerevisiae*) and micronutrients on enzymes activity, nodulation status, growth characteristics, chemical constituents, mycorrhizal infection (%) and yield of pea (*Pisum sativum* L.) cv. Master B grown under loamy sandy soil conditions. All estimated parameters were affected by biofertilizers application, especially in combination with foliar applied with yeast extract. The highest values of the most studied parameters were recorded in combination between biofertilizers with foliar application of micronutrients and yeast extract.<sup>(22)</sup>

11. Upendra M. Sainju, Andrew W. Lenssen, Brett L. Allen article on Pea Growth, Yield and Quality in Different Crop Rotations and Cultural Practices stated that Crop rotation and cultural practice had variable effect on dryland pea growth, yield, and quality in various years in the northern Great Plains, USA. In general, alternate-year rotation enhanced pea height, pod number, grain yield, and N uptake compared with stacked rotation, results that were contrary to our hypothesis. Improved cultural practice increased stand count compared with the traditional practice in dry years, but reduced pod number, biomass N content, and grain protein concentration in wet years. Seed number, seed weight, harvest index, and N harvest index varied with years. Pea growth, yield, and quality, however, responded well in years with above-average precipitation. Dryland pea growth, yield, and N uptake can be increased

using alternate-year crop rotation by enhancing pod number and plant height compared with stacked rotations. Additional research using other broadleaf and small grain crops is necessary to confirm that alternate year rotations are generally superior over time for pea production under dryland cropping systems in semiarid environments.<sup>(23)</sup>

12. Phosphoric acidum (PhA), the favorable effects of this treatment on the plant could be explained from the phosphoric acid composition and existing knowledge on its beneficial effects in agriculture. Phosphoric acid is used as a fertilizer for plants because it provides phosphorus, which is a very important element for the photosynthetic process and synthesis of organic compounds besides taking part in cellular respiration, storing energy, and forming flowers. Based on the previous information and deriving from the analysis of the results obtained in this research study, the use of this homeopathic medicine can be related to the positive impact on plant vigor, making some of its metabolic processes more efficient. To this respect, Castro, stated that Phosphorus improves the general characteristics in wheat plants and Duarte found a larger stem diameter in the white eucalyptus *Eucalyptus globulus* (Myrtaceae), with the application of this medicine. Similarly, Lovatt and Mikkelsen mentioned that phosphite (phosphoric acid) was absorbed faster by the plant tissues, which caused a greater growth, leaf development, and fruit size besides favoring the concentration of anthocyanins and promoting a greater photosynthetic activity<sup>(29)</sup>.

## **MATERIALS AND METHODS**

**Type of study:-** Agro-Homoeopathy

**Study design:-** Experimental study.

**Study setting:-** The study was conducted in MNR Homoeopathic Medical College premises in GREENHOUSE with good sunlight and ventilation.

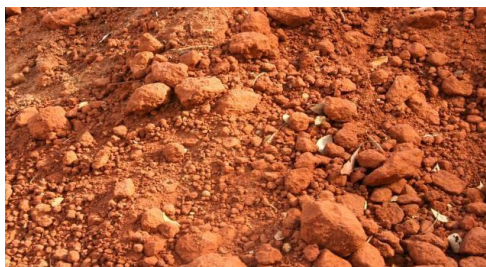
**Sample size:-** Total sample size is 15 plants. Each group contains 5 plants to analyze the parameters.

**Selection criteria:-**

- Inclusion Criteria:- Healthy seeds of green peas variety was taken.
- Exclusion Criteria:- Unhealthy seeds are not taken.

**MATERIALS USED:**

- Red soil:-  
As green peas grow well in red soil. I have selected the red soil for my study and it is taken from a Nursery in and around Sangareddy. [Give the GPS location!!](#)



**Fig:02-REDSOIL**

- Vermicompost.

It is collected from Acharya NGRanga Agricultural University, Hyderabad.

Plant height of pea was significantly increased by different vermicompost levels. Under the present investigation, the maximum significant plant height was recorded under vermicompost treatment. The maximum growth of pea with the application of vermicompost was noticed.

- Seeds: non-hybrid seeds of Green peas are procured from reliable local dealer.



**Fig:03.-GREEN PEA SEEDS**

- Drugs: Phosphorus 30C and 200C is procured from authentic Homoeopathic Pharmaceuticals Industrial outlet.

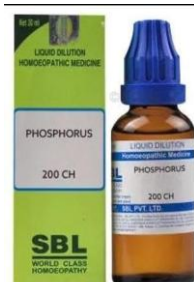


**Fig:04.-RED PHOSPHORUS**



**Fig:05.**

**PHOSPHORUS30C**



**Fig:06.**

**PHOSPHORUS200C**

**METHODS:**

Three separate groups will be created and each group contains 5 plants.

- Group A: Plants without addition of any medicine.
- Group B: Plants will be given Phosphorus 30c.
- Group C: Plants will be given Phosphorus 200c.

Sunlight, Water and Nutrients will be equally supplied for all the groups.

**PROCEDURE:**

- Sprouted Seeds will be directly planted in the pots.
- The medication will be initiated after the germination and repeated once in seven days.

**DOSAGE:**

The parameters of each group are analyzed individually and data is thus tabulated accordingly to the following table.

**STATISTICAL TEST:** The statistical data is analyzed by ANOVA. [Tell us how your mean separation among treatments was done!!](#)

**STUDY SUBJECTS:** Pisum Sativum (Green Pea) plants.

**STUDY PERIOD:** 4-6 months.

**SAMPLE SIZE:15****BRIEF OF PROCEDURES:-**

- Non hybrid varieties of green pea seeds are procured from authentic local dealer on 20/09/2023.
- And soaked these seeds for 24 hours and the seeds started to sprout after soaking for 24 hours in wet cloth.
- These sprouted seeds are sowed in soil on 22/09/2023., 30 seeds are sowed.
- Seeds started to germinate on day 5<sup>th</sup> i.e., on 27/09/2023.
- And the germination started in 17 seeds out of 30 seeds.
- After two weeks of sowing the height of the plants is 7 cms. And number of leaves are 19-22 for each plant.
- Healthy plants were separated and placed under 3 groups A, B, C.
- all the requirements like water sunlight were provided equally for all the three groups.
- All the essential nutrients were also been supplied equally.
- Then, after Phosphorous of two potencies i.e., 30C and 200C were being administered for groups B and C respectively. 10 drops of phosphorus dilutions were diluted in 10 liters of water and being administered for every three days except for the control group or for group A.
- No other fertilizers are being used in this procedure.
- The temperature and pH of the soil is monitored regularly.
- Group A - The control group plants grown up to 7-17 cms after 20 days. 2 out of 5 plants were attacked by aphids and caused bacterial blight, and powdery mildew and plant started to die gradually.
- Group B - the plants which have been treated with phosphorus 30C potency started flowering after 32 days of sowing these seeds.
- Group C - Plants started flowering after 30-34<sup>th</sup> days i.e., on 27/10/23-01/11/2023, early maturity, green pods started to grow from days 45-50 and full maturity happened 65-78 days after sowing these seeds.
- They are collected and the following parameters are analyzed from three groups.

□ Following are the parameters used to record and analyze:

1. Height of the plant.
2. Number of pods per plant.
3. Length of the pod.
4. Number of seeds.

[What about dry matter after harvest!!](#)

#### **DATA COLLECTION**

□ For prospective clinical study; data was collected at the baseline and compared with data obtained after treatment up to 3-4 months.

#### **STATISTICAL TECHNIQUES AND DATA ANALYSIS**

□ After study completion the results were represented by different statistical methods with proper analysis by using ANOVA test.

#### **PLAN FOR DATA ANALYSIS**

- The collected data was analyzed by ANOVA TEST.
- There is no conflict of interest.

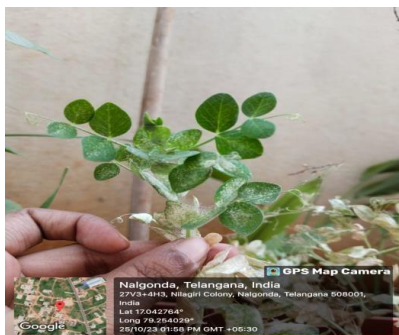
#### **OBSERVATION AND RESULT**



**Fig:07.(A): -22/09/2023**  
(Germination of sprouted seeds)



**Fig:07. (B): -17/10/2023**



**Fig:07(C): -25/10/2023**



**Fig:07(D): -29/10/2023**

**GROUP-A**

The non-hybrid seeds of green peas were taken from local authentic dealer and soaked for 24 hours and after sprouting these seeds were sown in soil on 22/09/2023 and the seeds started to germinate out of 5 germinated two plants died in between the study by showing symptoms like marginal necrosis and chlorosis with premature drop of leaves with young shoot tip cessation, failure to flower with lesions around the stems and petioles and the plants become wither off. The remaining 3 plants showed mild growth and yield.



**Fig:08(A):-27/09/2023**  
(Seeds started to germinate)



**Fig:08(B):-25/10/2023**



**Fig:08(C):-29/10/2023**



**Fig:08(D):-28/11/2023(pods)**

### GROUP-B

The non-hybrid seeds of green peas were taken from a local authentic dealer and soaked for 24 hours and after sprouting these seeds were sown in soil on 22/09/2023 and the seeds started to germinate on 27/09/2023. And homeopathic Phosphorus 30C was supplied by diluting in water for every three days. And moderate growth is noticed when compared to other two groups of plants.

**Comment [c4]:** Dilute in what ratios of water to the Phosphorus 30C?????



**Fig:09(A):-(27/09/2023)**  
**(Germination)**



**Fig:09(B):-27/10/2023**



**Fig:09(C):-02/12/2023**



**Fig:09(D):-04/12/2023**



**Fig:09(E): -14/12/2023**



**Fig:09(F):- 14/12/2023**

**GROUP-C**

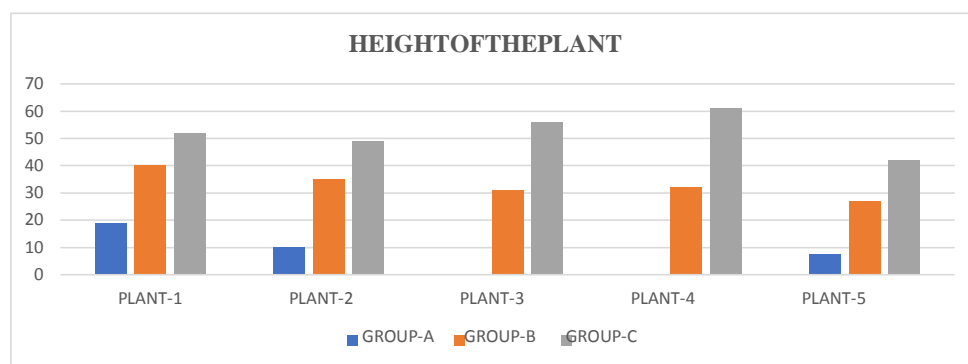
Thenonhybridseedsofgreenpeasweretakenfromlocal authenticdealerand soakedfor24hours andaftersproutingtheseedsweresowedinsoilon22/09/2023andtheseeds startedtogerminateon27/09/2023. Andhomeopathicphosphorus 200C was suppliedbydiluting inwaterforevery threedays.Andoverallproductionandyieldwasmorein thisgroup ofplants whencomparedtoothertwogroupofplants.

**PARAMETERSANALYSED:**

**1. HEIGHT OF THEPLANT:-**

PLANT NO.	GROUP-A	GROUP-B	GROUP-C
1.	19cms	40cms	52cms
2.	10cms	35cms	49cms
3.	-	31cms	56cms
4.	-	32cms	61cms
5.	7.5cms	27cms	42cms

**Table no.:01:HeightofThePlant**



**Fig:10: -HeightofThePlant**

**FINDINGS:**InregardstoHeightoftheplant:ingroupAwhichisofcontrol group hasshown lessgrowth whileinGroup B hasshowedslightgrowth with 30Cpotency,whereasin Group C has showedgoodresults with200C potency.

**2. NUMBEROF PODSPERPLANT:-**

PLANTNO.	GROUP-A	GROUP-B	GROUP-C
1.	9	47	69
2.	5	41	50
3.	-	38	71

4.	-	38	74
5.	3	29	42

Table no.:02:-NumberofPods perPlant.

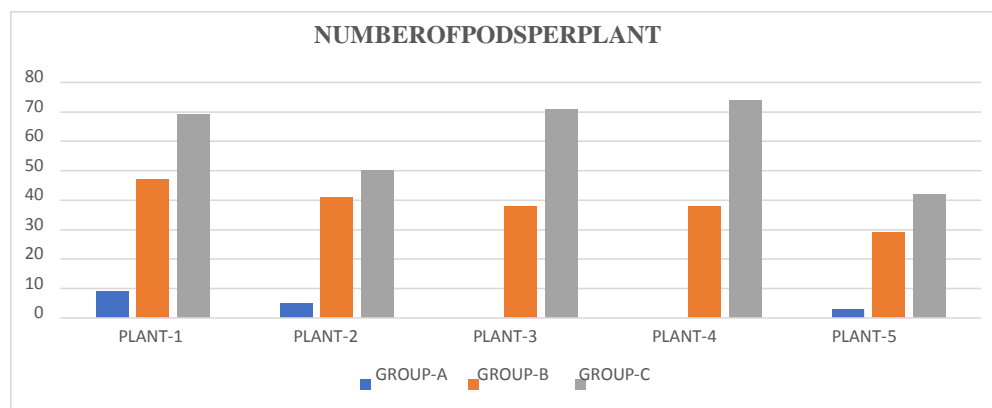


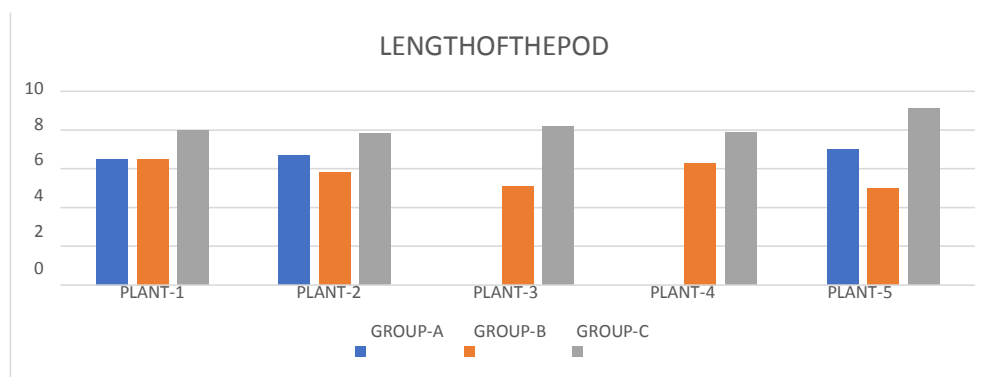
Fig:11: -NumberofPods perPlant

**FINDINGS:**GroupAorcontrolgroupplants producedlessnumberofpods,whileGroupB plants producedmoderatenumberofpods with30C potencywhereas GroupC plants produced morenumberofpods perplantwith200C potency.

3. LENGTHOF THEPOD: [I DO NOT SEE ANY Statistics here!!](#)

PLANT NO.	GROUP-A	GROUP-B	GROUP-C
1.	6.5	6.5cms	8cms
2.	6.7cms	5.8cms	7.8cms
3.	-	5.1cms	8.2cms
4.		6.3cms	7.9cms
5.	7cms	5.0cms	9.1cms

**Table no.:03:-LengthofThePod**



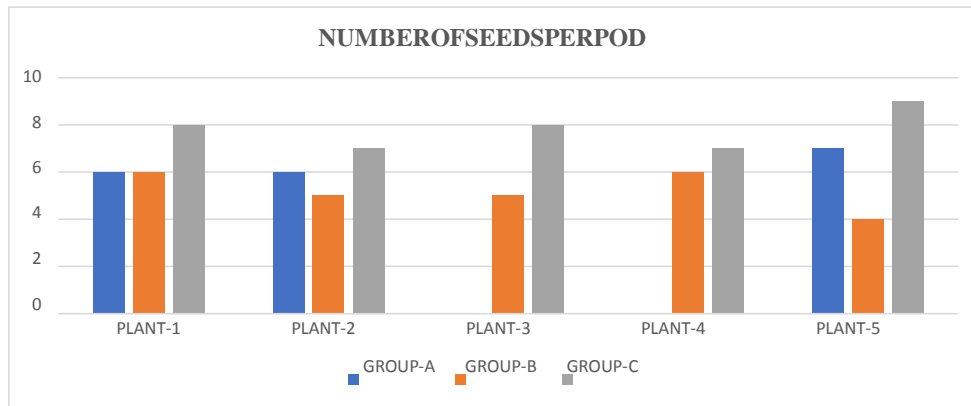
**Fig:12: -LengthofThePod**

**FINDINGS:**LengthofeachpodinGroupAplantsis 6-7cmswhileinGroupB plants the lengthofeachpodvariedbetween5-6.5cmswith30C potency,whereasinGroupCthelength variedbetween7-9cms with200C potency.

**4. NUMBEROFSEEDSPERPOD:-**

PLANT NO:	GROUP-A	GROUP-B	GROUP-C
1.	6	6	8
2.	6	5	7
3.	-	5	8
4.	-	6	7
5.	7	4	9

**Table no.04:-NumberofSeeds perPod**



**Fig:13: -NumberofSeeds perPod**

**FINDINGS:** In group A the number of seeds per pod are between 6-7 without any medicine while in group B plants the number of seeds were between 4-6 with 30C potency, whereas in Group C the number of seeds is between 7-9 per pod with 200C potency.

**STATISTICAL ANALYSIS:-**

Source of variation	Sum of Squares	Degree of Freedom	F -ratio
Between the samples	Sum of Squares between the samples = 731.07	K-1 3-1=2	365.5/29.5 =12.38
Within samples	Sum of squares within the samples = 354	R-K 15-3=12	12.38 F-ratio

**Table no.05: Statistical Analysis.**

This table shows that the calculated value of 'F' ratio is 12.38 which is more than the table value of 3.4903 at 5% level with degree of freedom.  $V_1=2$  and  $V_2=12$ .

This analysis supports the research hypothesis of difference in means. So Green pea is having difference between the potencies and within the potencies. So, the study is highly significant. [This is confusing because I was expecting to see Statistics results with treatments of your Phosphorus and measured parameters showing some differences among treatments of the P. But here I do not see that. I do not see any replicates in your methodology@@](#)

## DISCUSSION

In regard to height of the plant, phosphorus 200C acted well when compared to the plants of control group and plants of phosphorus 30C group. In a group 200C showed significant increase in number of pods per plant and length of the pod and number of seeds per pod.

In case of plants of Group A which are not been treated with phosphorus, 2 plants out of 5 plants died in between the study by showing symptoms marginal necrosis and chlorosis with premature drop of leaves with young shoot tip cessation, failure to flower with lesions around the stems and petioles and the plants become wither off. The remaining plants showed mild growth and yield when compared to the other two groups of plants which are been supplied with homeopathic phosphorus of potencies 30C and 200C.

In case of plants of Group-B all the five plants showed moderate growth in height of plant, no. of pods per plant, length of the pod and no. of seeds per pod which were supplied with Phosphorus 30C potency.

In case of Group-C plants all the five plants showed marked results when compared to the other two groups; in regard to height of the plant, number of pods per plant, length of the pod and number of seeds per pod which were supplied with dilutions of Phosphorus 200C.

Total yield including other parameters like height of the plant, number of pods per plant, length of pods and number of seeds per pod of *Pisum sativum* is having good result with 200C potency of phosphorus when compared to that of control group and 30C potency group.

Therefore, Phosphorus 200C alleviates growth and production of *Pisum Sativum* and reduces the effects caused by Phosphorus deficiency.

**CONCLUSION:-**

The aim is to avoid fertilizers which may affect the health of human beings. So, to develop the organic farming, application of homeopathic medicines for agriculture is playing a key role in healthy cultivating practices. Concluding the above discussed points, we derive the conclusion stating that Phosphorus 200C has significantly influenced the growth and yield of green peas thereby contributing to rise in the economic output. Further studies are required on large scale to validate and confirm the current findings. In addition to the yield, nutritive value can also be analysed to have a detailed overview of the same.

**SUMMARY**

*Pisum Sativum* is one of the commonest crops grown in India. Therefore, increasing the yield of green pea plants without harming the soil with chemicals are important. In places where there is deficiency of phosphorus in soil resulted in decreased production of green pea plants. Hence phosphorus is thus selected to investigate and compare the efficacy of phosphorus on growth and yield of *Pisum Sativum* (Green Peas) with two different potencies of homeopathic phosphorus dilutions.

For the study 15 plants were taken and divided into 3 groups which includes group-A named as control group, Group-B plants which are been supplied with Phosphorus 30C and Group-C plants which are been treated with Phosphorus 200C. The plants of Groups A and B were administered with dilutions of Phosphorus 30C and 200C respectively directly by diluting in water every third day. No other fertilizer or chemicals were added. Following are the parameters which are recorded- Height of the plant, Number of pods per plant, Length of the pod and Number of seeds per pod.

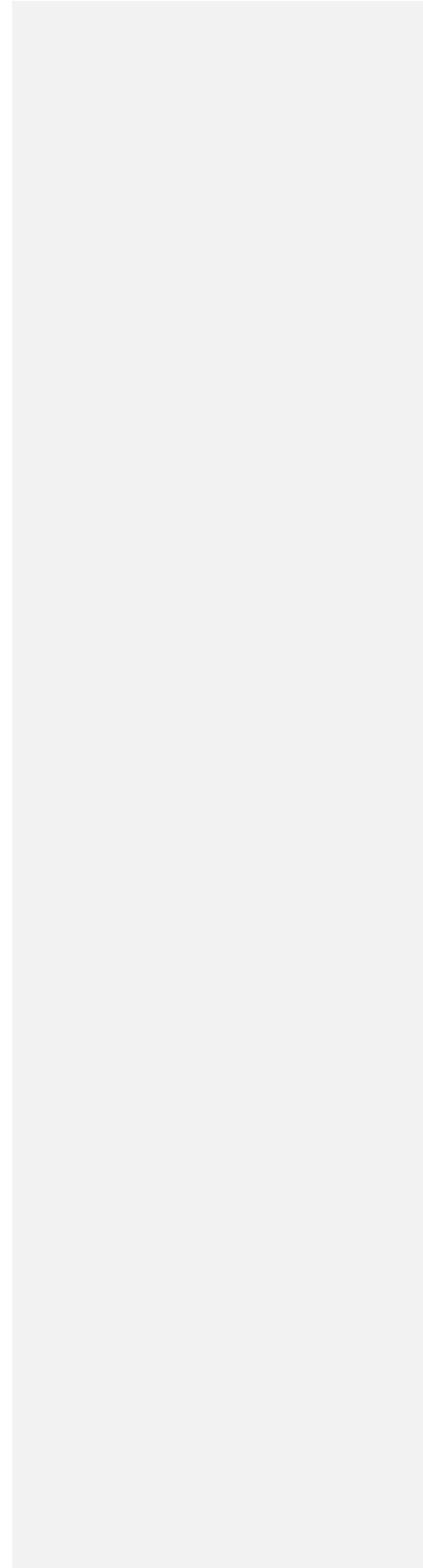
And the data was then analysed by using statistical tool ANOVA test. Conclusion derived was Phosphorus 200C has significantly influenced in the growth and yield of *Pisum Sativum* plant in regard to Height of the plant, Number of Pods per Plant, Length of the Pod, and Number of Seeds per Pod.

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