ISSN: 2278-6864
Vol-47, Issue-1, No.-6, January-March : 2023

A STUDY ON EFFECTIVENESS OF HOMOEOPATHIC MEDICINE PHOSPHOROUS IN GROWTH OF HYDROPONIC ZEA MAYS

Nayana Suresh, Aparna Prakash, Arun S. Raj and Murugan. M
Department of Organon of Medicine and Homoeopathic Philosophy,
Sarada Krishna Homoeopathic Medical College, Tamilnadu, India

Rajeswari K. R
PG Scholar, Department of Organon of Medicine and Homoeopathic Philosophy,
Sarada Krishna Homoeopathic Medical College, Tamilnadu, India
dr.rajeswarikr@gmail.com

Abstract

The most iconic feature of homoeopathy is that it has a demonstrable effect not just in humans, but also in animals and plants, even when administered in infinitesimal doses, excluding the potential of a placebo effect. Hydroponics fodder production is growing plants in a greenhouse devoid of soil, in water or a nutrient-rich medium, for a short period of time (about 7 days). Zea Mays is a better alternative for hydroponic fodder production due to its availability, lower seed prices, greater biomass production, greater seed to biomass proportion, and better growth habit. The purpose of this controlled experimental prospective study was to see how different potencies of homoeopathic medicine Phosphorous (6C, 30C, 200C, 10M, and 0/3) affected hydroponic Zea Mays growth, height, weight, and protein content. This research aided in evaluating and establishing the role of homoeopathy in plant growth propagation. When compared to all other potencies and controls, the findings of this study on several metrics such as growth, number of roots, root length, shoot length, and protein content of hydroponic Zea Mays demonstrated that Phosphorous 10M was quite effective.

Keywords: *Homoeopathy; Hydroponics; Phosphorous; Potencies; Zea Mays.*

INTRODUCTION

Dr. Samuel Hahnemann established homoeopathy, a scientific and unique therapeutic system of medicine based on specific laws and principles. The essential law of homoeopathy is 'Similia Similibus Curenter,' which means 'let likes be cured by likes'. Homoeopathy works by enhancing the body's innate ability to repair itself.

Hydroponics is a cutting-edge technique that has transformed green fodder production in the 21st century. The word hydroponics has been derived from the Greek word 'water working'. Hydro means 'water' and ponic means 'working' (Berry WL., 1996). Hydroponics is a cost- effective and long-term solution for dairy farming, making nutritious green fodder production easier and faster conserving water, land and also environmentally friendly. It increases profit while reducing concentrate feeding (Naik PK et al., 2014).

Domesticated animals are fed fodder / provender, which is a form of agricultural feed. Green fodder is a low-cost food source for dairy animals that is both appealing and digestible, and it helps to increase milk yield and quality (Hassen A. 2001) Green fodder is in high demand due to the more intense system of livestock husbandry. Fodder seeds are germinated into a high quality, highly nutritious, disease-free animal food in a hygienic environment (Bekuma A., 2019)

Zea Mays is a preferred choice for hydroponic fodder production because of its availability, low seed cost, higher biomass production, higher seed to biomass ratio, and faster development habit (Ningoji SN et al., 2020). In terms of accessible organic matter, crude protein, ether extract, and nitrogen free extract content, Zea mays is more nutritious than traditional fodder Zea mays (Naik PK et al., 2012).

Plants grown in hydroponic greenhouses mature more quickly and are less susceptible to pests and diseases. Hydroponics ensures that optimal climatic conditions are maintained for maximum photosynthetic performance. It increases crop yield by generating more energy during photosynthesis. Hydroponic greenhouse systems make better use of water (Jensen MH., 1997).

In agricultural cropping systems, Phosphorus (P) is one of the scarcest nutrients. Nearly 67 percent of the world's cropland is thought to be deficient in P (Pereira NC et al., 2020). Phosphorus is necessary for generating strong seedling growth by increasing root and shoot growth. P is one of the twelve essential nutrients for plants to thrive. Phosphorous is required in greater proportions by plants with vigorous and brief cycle development, such as Zea Mays. Modern agriculture must adapt to society's changing needs, both in terms of food quality and environmental concerns associated to primary production.

MATERIALS AND METHODS

Study Design

Randomized Complete Block Design: Randomization of treatments to experimental units takes place within each block. Each block represents each different potencies of phosphorous ranging from 6C, 30C, 200C, 10M, 0/3 and two controls - plain control and 91% alcohol control respectively. (C denotes the centesimal scale of potency in medicine preparation introduced by Dr. Samuel Hahnemann, where the drug strength will be 1/100. 0/3 denotes the LM scale of medicinal preparation where the drug strength will be $1/5 \times 10^8$).

Study Setting

Study has been conducted in hydroponics fodder system in green house at Neyyattinkara, Kerala (lat. 8° N, long. 77°E) for a short duration of 7 days.

Selection of Sample

For this study, 21 kg of fodder Zea Mays were used. Three replicas were taken for scientific validity. Each replica has 7 groups with various potencies of Phosphorous - (P 6C, 30C, 200C, 10M, 0/3) and 2 controls (plain control and 91% alcohol control).

Methodology

In this experimental study there were three replicas where data was measured daily from day 1 to day 7.

Washing And Weighing

The 21 Kg of good quality fodder Zea mays were selected. Seeds were manually cleaned in tap water with a wooden stick to remove chaff and debris.1 Kg of Zea mays seeds were weighed and were put in 21 different bowls.

Preparation of Treatment

Each of the respective labelled bowls are filled with 1.5 L of distilled water and 1 kg Zea mays seeds. In the labelled bowl, for plain control no medicine was added. To bowl of 91% Alcohol Control - 20 drops of 91% alcohol added. To bowl of Phosphorus 6C - 60 drops of P 6C (1:500) added. To bowl of Phosphorus 30 - 30 drops (1:1000), phosphorous 200 - 15 drops (1:2000), phosphorous 10M - 3 drops (1:10000) and phosphorous 0/3 - 1 pill (1:20000) are added respectively.

Soaking

The soaking procedure was done for 24 hours. The entire procedure was repeated for all replicas 2 and 3.

ISSN: 2278-6864
Vol-47, Issue-1, No.-6, January-March : 2023

Transferring to Germination Bags

After 24 hours of soaking, water was drained and seeds were transferred to germination bags. For sprouting, the seeds were stored in germination bags for 24 hours.

Transferring to Trays

The sprouts after germination were obtained as shown in **Figure 1(A)**. These germinated sprouts were placed on the respective labeled hydroponic fodder trays as shown in **Figure 1(B)** and **1(C)**. Each tray was provided with sprinkler which sprinkles water for 40 sec in every 2 hours.

Figure 1: Sprouted Zea Mays Seeds in Hydroponic Fodder System

GROWTH ASSESSMENT

The growth of the Zea mays plants were assessed daily by taking their root and shoot length using 30 cm ruler. The tray weight and the root bed thickness were measured on the seventh day.

HARVESTING

After 7 days of growth period, all the parameters were assessed. The fodder Zea Mays were harvested and kept in shade for drying as shown in **Figure 2**.

ISSN: 2278-6864
Vol-47, Issue-1, No.-6, January-March : 2023

Figure 2: Harvested Zea mays in shade

DRYING

They were all kept for drying under shade. They were dried for around 6 days under shade and were dried in hot air oven and powdered at Government Agricultural College, Vellayani, Trivandrum. After collecting the powderd specimen, it was double blinded using alphabets and numericals and then packed and sent for nutritive analysis to Saint Dominic College, Kanjirapalli, Kottayam, Kerala.

RESULTS

This section contains observations and results of the study of various potencies of Phosphorous in fodder Zea Mays presented in tables and charts as well as their statistical analysis. In study of growth assessment by using homoeopathic medicine P in various potencies (plain control, 91% alcohol control, P 6C, P 30C, P 200C, P 10M, P0/3) were analyzed daily and their measurements were taken. The parameters that were analyzed daily were root length, number of roots, shoot length, number of leaves. Tray weight and root bed thickness were measured on the 7th day. The nutritive values of the various potencies as well as the controls were analyzed in the lab at St. Dominics College, Kanirapally, Kottayam after drying it for 1 week under shade, then oven drying and powdering it at Government college of Agriculture, Trivandrum, Kerala. The photos for daily analysis of growth of Zea mays plants from day 1 to day 7 are given below in **Figure 3**.

ISSN: 2278-6864
Vol-47, Issue-1, No.-6, January-March : 2023

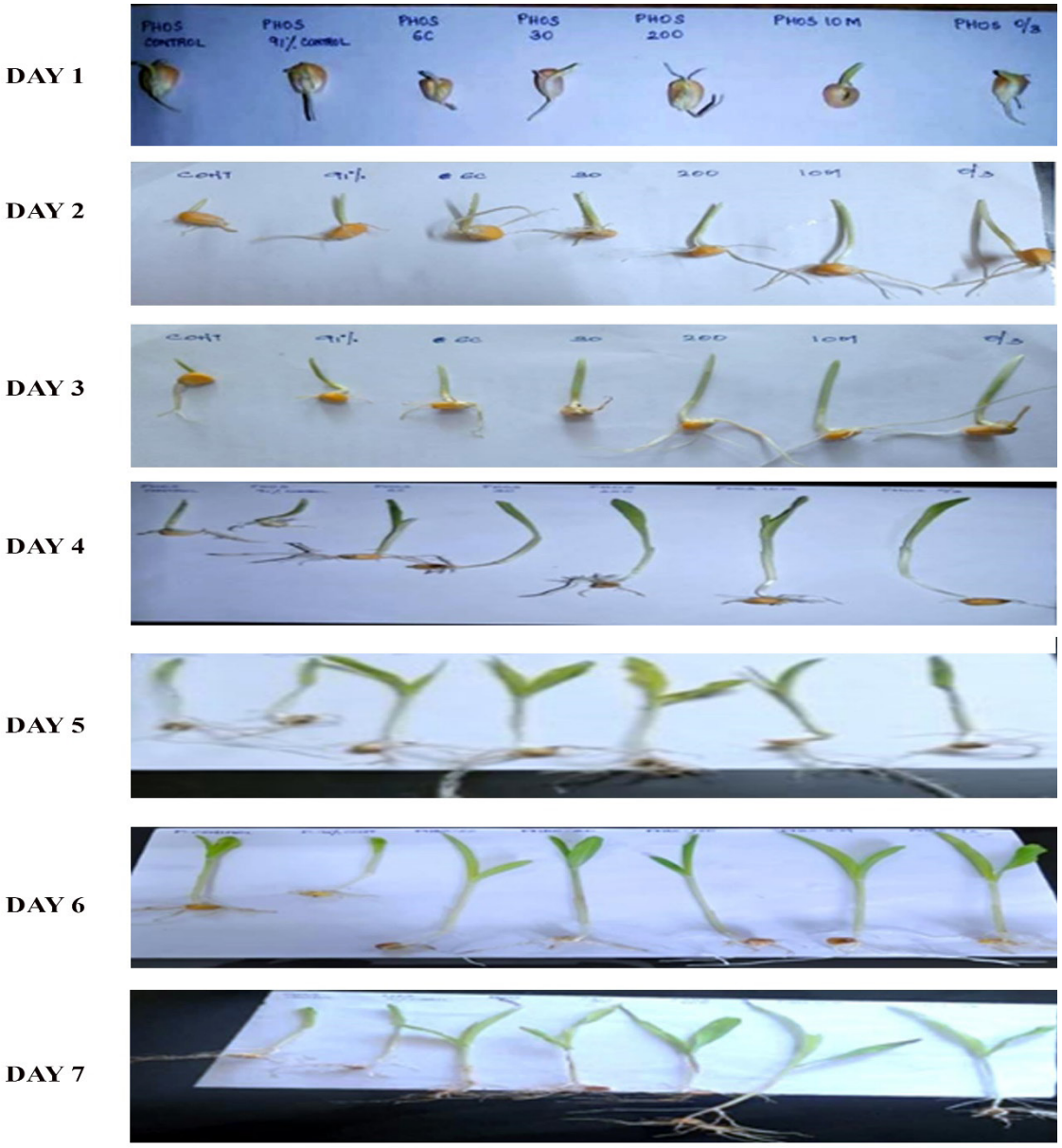

Figure 3: Daily growth analysis of Zea Mays

Tray weight was measured using a weighing scale for all the different potencies of P as shown in **Figure 4.**

ISSN: 2278-6864
Vol-47, Issue-1, No.-6, January-March : 2023

Figure 4: Weighing full grown trays

Root bed thickness was also measured using a measuring scale on the 7th day for all the potencies of P.

Table 1: Average measurements of various parameters on P potencies on average number of roots, leaves, root length, shoot length and tray weight.

Parameter	Control	91% alcohol	Phos 6C	Phos 30	Phos 200	Phos 10M	Phos 0/3
No of roots	10	8	14	11	13	15	13
Root length (in cm)	5.63	3.37	6.27	4.93	6.83	8.40	6.53
Shoot length (in cm)	3.40	3.00	5.33	4.87	5.57	8.07	6.27
Root bed Thickness (in cm)	1.3	1.2	3.3	2.1	2.5	3.9	3.7
Tray weight (in kg)	2.3	1.8	3.7	2.7	3	4.2	3.5

FINDINGS

In this study, on considering the parameters the findings are:

Number of Roots - The maximum number of roots was seen in P 10M (15 roots) and the least number of roots was in 91% alcohol control (8 roots).

Root length – Maximum 8.40cm seen in P 10M and minimum length observed in 91% alcohol control was 3.37 cm.

Shoot length – The maximum length of 8.07cm was seen in P 10M and minimum length of 3.00 cm was observed in 91% alcohol control.

Root bed thickness – Maximum thickness of 3.9cm was seen in P 10M and minimum length of 1.2 cm was observed in 91% alcohol control.

Tray weight – The maximum weight of 4.2Kg was seen in P 10M and minimum weight of 1.8 Kg was observed in 91% alcohol control.

STATISTICS ON OBSERVED PARAMETERS

In the present study, statistical analysis using two-way ANOVA showed there was significant difference for root and shoot length at P value < 0.05 in all the treatment. Similarly, POST HOC ANOVA with different treatments showed that mean difference is significant at 0.05 level. Based on post hoc test, it is evident that P 10M and P 30C shows significant growth in root length and shoot length among all the parameters. Based on post hoc test, it is evident that P 10M shows significant growth in root bed thickness among all the parameters.

NUTRITIVE ASSESSMENT OF PROTEIN

The protein content of Zea Mays has been analyzed using Lowry's Method. The results were tabulated in **Table 2.**

Table 2: Protein Analysis of Zea Mays treated with Various Potencies of P

Replicas	Control (µg/ml)	91% Control (µg/ml)	P 6C (µg/ml)	P 30 (µg/ml)	P 200 (µg/ml)	P 10 M (µg/ml)	P 0/3 (µg/ml)
1	244.4	116.8	275.6	273.2	266	319.2	276.4
2	254	216	254.8	316.4	282.8	337.6	290.4
3	222.8	253.2	243.2	212.4	285.6	318	306.4
Total	721.2	586	773.6	802	834.4	974.8	873.2
Average	240.40	195.33	257.87	267.33	278.13	324.93	291.07

DISCUSSION

Using homoeopathic drugs in production of hydroponic green fodder is simple, inexpensive and effective. In this study the ultra-high dilutions of homeopathic medicine Phosphorous in varying potencies ranging from 6C, 30C, 200C, 10M and 0/3 showed significant increase on the growth parameters as well as in protein content.

Further review of literature reveals that in another hydroponic study using P, plant tissues assimilated 11 to 25% of total P input. 79 to 89% of total P input was lost via waste water and only 11 to 21% was assimilated into plant biomass (Yang T et al., 2020). In the light of literature by Liu H, the effects of P supply on subcellular distribution and chemical forms of Se in winter wheat were investigated in a hydroponic trial and found that an increase in P supply enhanced Se accumulation in the cell wall of plant stems (both apical and axillary stem) and cell organelles of plants leaves, providing a practical way to enhance Se intake for humans (Liu H et al., 2019).

As found in our study increased P uptake resulted in enhanced plant biomass in the study done by Tu S (Tu S., 2003). Another study signifies the need of this research stating that, even when present in the soil in higher amounts, P availability to plants is often still problematic because of the phosphate-binding capacity of several types of soil (Van de Wiel C et al., 2019).

CONCLUSION

Homeopathy is constantly challenged by its ultra-high dilutions, which are impossible to explain because they exceed Avogadro's constant unit ($6.023x10^{-23}$) (Prashant S *et al.,* 2013), but in this research work the ultra-high dilutions of homeopathic medicine P in varying potencies ranging from 6C,30C,200C,10M and 0/3 which have dilution strength from (10^{-12} to $10^{-100000}$) has shown its own unique significant results in the parameters evaluated in this study namely, number of roots, root length, shoot length, root bed thickness, tray weight and protein content.

There was a significant increase on the growth parameters in every potency of P when compared to controls. This was observed in all the 3 replicas. P 10M showed the highest growth with shoot length of 8.07cm; number of roots - 15; root length 8.40cm, protein content - 324.93 µg/ml and tray weight of 4.2Kg.

This research is an answer to the question raised by Herbert A. Roberts, "Young man, what have you to offer Homoeopathy?" (Roberts HA., 1997).

This study done in plants proves that homoeopathy is not just placebo, but a wonderful system beneficent even to nature. It can do wonders to human being; without doubt it is one of the precious gifts of God for the benefit of mankind.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to research, authorship and/or publication of this article

ACKNOWLEDGEMENTS

- Dr. Roy Stephen, Professor of Plant Physiology & Associate Director of Research, Regional Agricultural Research Station, Vellayani, Trivandrum.
- Dr. Usha C.Thomas, Assistant professor (Agronomy), AICRP on forage crops and its utilization, Govt. college of agriculture, Vellayani, Trivandrum.
- Prof. Michael Thomas, Head of the Department of Botany at St. Dominic's College, Kanjirapally, Kerala
- Dr. Padmaja Priyadarshini, Statistician, Sarada Krishna Homoeopathic Medical College, Kulasekharam, Tamilnadu.
- Dr. James Joseph, Prince homoeopathic clinic, Kottayam, Kerala.

REFERENCES

1. Bekuma A. Nutritional Benefit and Economic Value of Hydroponics Fodder Production Technology in Sustainable Livestock Production Against Climate Change-A Mini-Review. Advances in Applied Sciences. 2019;4(1):23-5.
2. Berry WL. The evolution of hydroponics. InHydroponic Society of America. Proccedings of 17 th Conference, San Jose, CA, USA 1996 Jun 28 (pp. 87-95).
3. Hassen A, Dawid I. Contribution of Hydroponic Feed for Livestock Production and Productivity: A Review.2001 Jan 28.
4. Jensen MH. Hydroponics worldwide. InInternational Symposium on Growing Media and Hydroponics 481 1997 May 19 (pp. 719-730).
5. Liu H, Shi Z, Li J, Zhao P, Qin S, Nie Z. The impact of phosphorus supply on selenium uptake during hydroponics experiment of winter wheat (Triticum aestivum) in China. Frontiers in plant science. 2018 Mar 20;9:373.
6. Naik PK, Dhuri RB, Karunakaran M, Swain BK, Singh NP. Effect of feeding hydroponics maize fodder on digestibility of nutrients and milk production in lactating cows. Indian Journal of Animal Sciences. 2014 Aug 1;84(8):880-3.
7. Naik PK, Dhuri RB, Swain BK, Singh NP. Nutrient changes with the growth of hydroponics fodder Zea mays. Indian Journal of Animal Nutrition.2012;29(2):161-3
8. Ningoji SN, Thimmegowda MN, Boraiah B, Anand MR, Murthy RK, Asha NN. Influence of seed rate on growth, yield and economics of hydroponic fodder Zea mays production. Range Management and Agroforestry.2020;41(1):108-15.
9. Pereira NC, Galindo FS, Gazola RP, Dupas E, Rosa PA, Mortinho ES. Zea mays yield and phosphorus use efficiency response to phosphorus rates associated with plant growth promoting bacteria. Frontiers in Environmental Science. 2020 Apr7;8:40.
10. Prashant S. Chikramane,Akkihebbal K Suresh, Jayesh Ramesh Bellareand Shantaram Govind Kan.Extreme homeopathic dilutions retain starting materials: A nanoparticulate perspective. Homeopathy: The Faculty of Homeopathy 2010; 99:231-242.
11. Roberts HA. The Principles and Art of Cure by Homoeopathy: A Modern Textbook. B. Jain Publishers; 1997. Chapter 1, What has Homoeopathy to offer the Young Man?; p.6.
12. Tu S, Ma LQ. Interactive effects of pH, arsenic and phosphorus on uptake of As and P and growth of the arsenic hyperaccumulator Pteris vittata L. under hydroponic conditions. Environmental and Experimental Botany. 2003 Dec 1;50(3):243-51.
13. Van de Wiel C, van der Linden CG, Scholten OE. Improving phosphorus use efficiency in agriculture: opportunities for breeding. Euphytica. 2016 Jan;207(1):1-22.
14. Yang T, Kim HJ. Comparisons of nitrogen and phosphorus mass balance for tomato-, basil-, and lettuce-based aquaponic and hydroponic systems. Journal of Cleaner Production. 2020 Nov 20;274:122619.