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Cultivation Of Seeds of Vigna Radiata and Cicer Arietinum Using the Water Farming

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ABSTRACT
In India, hydroponics was introduced in year 1946 by an English scientist west Bengal. It is a methodof growing plant using mineral nutrient solutions without soil. Sand is useful as a growing medium forplants that require a dry environment with loose soil. Excessive water will produce runoff and not soakinto sand as it would in clay. All essential nutrients are supplied to soilless culture plants in the form of nutrients olution; nutrition is easily achieved in soil less culture than in soil. The chickpea is rich source of vitamins, fibers and minerals; it provides variety of health benefits like aiding weight management, improving digestion and lessens the risk of several diseases. The chickpea is high in protein and it is the best way to replace meat in vegetarian and vegan diets. Mung bean (Vigna radiata L.) is a leguminous pulse crop for its use as a vegetable protein source, animal fodder and green manure, it contains is oflavonoids having estrogen and antioxidant activities that used in prevention of much diseases such as cancer, it also exhibits antimicrobial and insecticidal activities. Thus we selected Seeds of Vigna plant and Cicer plant were taken to study root and shoot development through hydoponics. For a certain timeinterval,the germinationpattern of bothplants waschecked and recorded.
Keywords: Soil Less Culture, Vigna Seeds, Cicer Seeds, Germination

I. INTRODUCTION
Seeds plays important role in world's diet, as it takes half of per capita energy intake all over the globe; it comprises about 90% of all cultivar, in plant physiology, seed biology is one of the most researched area (Bewley, 1997).

Mung bean (Vigna radiata L.) commonly known as green gram is an ancient and well-known pulse crop that belongs to family Papilionaceae and originated from South East Asia (Mogotsi, 2006). Mung beans are mainly grown for human food, in the form of boiled dry beans, stew, flour, sprouts and immature pods as a vegetable. The dry beans are sometimes used for animal food, mainly poultry, when they are either roasted or boiled while its biomass is used as fodder (Winch, 2006). Thus, it has great value as food and fodder. It is a cheap source of protein for human consumption. Chick pea is a rich source of protein, carbohydrates, lipid content, fibre and minerals i.e. iron, magnesium, phosphorus, zinc etc. Amino acids such as tryptophan, lysine, isoleucine etc. are abundant in the selected plant product. With high calorific value selected plant species is proved to be unsurpassed for the experiment. Due to rise in population and contradictory decline in land size available for agriculture, situate to introduce a new method of agriculture for increasing potential of cultivation.

Hydroponics is a method of growing plant using mineral nutrient solutions without soil. In India, hydroponics wasintroduced in year 1946 by an English scientist in west Bengal. There are different types of methods used in hydroponics :

i) Nutrient film technique: Hydroponics gardening utilizing an oxygen richnutrient solution, is an ideal system for a wide range of crops including lettuce, strawberries, herbs,flowers, tomatoes peppers, eggplant, squash and cucumbers.
ii) ii) Drip watering technique: Popular withsmall commercial hydroponics growing operations, hobbyists and schools this system is designed to growtomatoes, cucumbers, peppers, herbs and flower crops.
iii) iii) Aeroponics technique: Excellent for startinglarge crops of seedlings, transplants and cuttings or growing plants or crops to full maturity, this systemspraysthe roots with nutrient-rich water(Koohakan, 2008).

Uses of Hydroponics

a) Land conservation: Because of hydroponics primarily use of water to cultivate plants, the earth'snatural soil structure is preserved .traditionalfarming uses heavy equipments and fertilizers that damagethe quality of the top soil and causing erosion. With hydroponics farms produce more crops with lessspace at any location, thereby decreasing the need to graze forest or additional farmlands to boost production.
b) Reduction of pest and plant diseases: Farmers and gardeners usually spend a lot of timeand energy applying pesticides to free their plants from weeds and plant diseases. With hydroponics, soil-borne plant diseases and weeds are eliminated, significantly reducing the need for pesticides and herbicides.
c) Water conservation: Certain types of hydroponic systems are fully automated and allow for there cycling of nutrients and water. This allows farmers to minimize plant irrigation and fertilization. This also allows growers to leave their plants unattended for a certain number of days.
d) Control overplant growth: Hydroponic farming methods allow growers to regulate the chemical composition of thewater or soil- less aggregates. In traditional farming, growers tend to spend a lot of time, money and energy in adjusting the acidity or balancing the chemical components of the soil—like buying sacks or cans of fertilizers and chemicals for seasoning the land--before transplanting seedlings.
e) Higher yield: In hydroponics, water and nutrients are available year round, so farmers don't have to wait for the rainy or planting seasons to plant seeds. This means plants can be grow nor harvested all year, even if out season.
f) In expensive set-up: Some hydroponic systems are expensive and complicated to setup. There are still brands in the market, however, that are affordable and don't require expert knowledge to install. Thesesystems can be set up indoors or outdoors, provided that sunlight or artificial light is available. This isbeneficial to novice hydroponic farmers because it is simple to maintain. Other systems are even custom-made or improvised by using recycled materials.
g) Next frontier in agriculture: Future advancements inhydroponics may lead to a solution to the world's food problem. Countries with few arable land orinhospitableclimatecan use thistechnologyfor large-scale farming.

The hydroponic conditions (presence of fertilizer and high humidity) create an environment thatstimulates salmonella growth. Another disadvantageis pathogens attacks including damp-off due to Verticillium wilt caused by the high moisture levels associated with hydroponics and

overwatering of soil based plants. Also, many hydroponic plants require different fertilizers and containment system.

II. REVIEW OF LITERATURE

Soils do pose serious limitations for plant growth too, at times. In addition, Open Field Agriculture isdifficult as it involves large space, lot of labour and large volume of water (Beibel, 1960). In most urbanand industrial areas, soil is less available for crop growing, or in some areas, there is scarcity of fertilecultivable arable lands due to their unfavorable geographical or topographical conditions (Beibel, 1960).Other serious problem experienced is to hire labour at regular times for conventional open field agriculture(Butler&Oebker, 2006). Undersuch circumstances, soil-less culture can be introduced successfully (Butler &Oebker, 2006).Soilless culture is the technique of growing plants in soil-lesscondition with their roots immersed in nutrient solution (Maharana&Koul, 2004). Soilless culture systems of cultivation can be classified according to the techniques employed. It supplies fresh vegetablesin countrieswith limited arableland aswellas in smallcountrieswith large populations. It could be useful to provide sufficient fresh vegetables for the indigenous population as well as for tourists incountries where tourism plays a vital role in their economy. Typical examples of such regions are theWest Indies and Hawaii, which each have a large tourist industry and very little farmland for vegetable production (Resh, 1993). In soilless culture some cultural practices like soil cultivation and weed controlare avoided, and land not suitable for soil cultivation can be used (Polycarpouet al., 2005). Plants grownby hydroponics had consistently superior quality, high yield, rapid harvest, and high nutrient content.Soilless culture could be applied to growing some popular local crops with the application of food safety standards and at a reasonable price (Paul, 2000). This system will also helps to face the challenges of climate change and also helps in production system management for efficient utilization of natural resources and mitigating malnutrition (Butler&Oebker, 2006).

III. MATERIAL AND METHODS

Sand is useful as a growing medium for plants that require a dry environment with loose soil. Excessive water will produce runoff and not soak into sand as it would in clay. Root plants like carrots and potatoes produce more vegetables in sand because it is lightweight and easy for them to expand in and does not hold too much moisture. Plants require 17 essential elements for their growth and development. Without these nutrients plants cannot complete their life cycles and their roles in plantgrowth cannot be replaced by any other elements. All essential nutrients are supplied to soilless culture plants in the form of nutrient solution, nutrition is easily achieved in soilless culture than in soil.

Table 1. Chemicals usedtomake 1liter solution

Ca(NO3)2	0.8gm
KNO3	0.2gm
MgSO4	0.2gm
KH2PO4	0.2gm
FePO4	0.02(traceelement)
Water	1liter

Vigna Radiata (Fig.1 - mung, fabacece- pea family) and cicerarietinum (Fig.. 2 - Chana, fabacece-peafamily)is the common plants which is selected for experiment.

Fig : 1 Vignaseeds

Fig : 2 Cicerseeds

Plastic bottles were chosen for experiment.Two selected plants and sand were washed thoroughly.Ten seeds were sown in each plastic bottle. On 24th February, 2018, sowing was done. Observations forgerminationrecordedfor eachday. Fresh Nutrient mediumwas providedtwiceina day.

IV. RESULT AND DISCUSSION

Figure : 3 Vignaseedgermination

Figure: 4 Cicerseedgermination

Seeds are sown on 24thFebruary, on 26th February sprouting of one seedling occurs. On 27th February, remaining eight seeds get germinated. On 28thFebruary,shoot and root development started in all seeds of cicer plant.

Seeds are sown on 24th February, on 26th February sprouting of one seedling occurs. On 27th February,remaining 6 seeds get germinated. On 28th February, shoot and root development started in all seeds of vigna plant. Leaf initiation was also observed after 72 hr of seed propagation (Wang, 1999). Fruiting and flowering was not observed in the experiment and required some more attempts with modification in experimental design. In aspect of total mass productivity it was found that the feasibility of the technique with selected plant species was good.

V. CONCLUSION

Future aspects from the mentioned technique are really very high. Pharmaceutical industries are facing problem of continuous supply of medicinal plant and their products. Many herbs and shrubs are known for their medicinal properties can be easily grown by hydroponic without altering their biochemical composition. Green house facility prevents the supply of plant and their product in specific season. In controlled environment we can cultivate plant throughout the year.

According to literature reviewed one of the best future aspects associated with hydroponics is space technology. It is well known practice that the space mission includes a long term accommodation at space station. It is really a big trouble to carry plenty of food products with many numbers of people in single spacecraft. Spoilage and maintenance of food product is also a significant problem in space missions. Hence, the scientists are trying to find out some substitute. Theoretically in place of large mass of food product, it is easy to carry seed and nutrients dissolved in water (Prabhas et al., 2016).

Cultivation of plant, utilization and release of waste material in space eradicate burden from the spacecraft. We can reduce burden of weight in spacecraft in both the ways i.e. departure and arrival. Indoor home gardening may be encouraged by this unique technique of horticulture. Many ornamental plant species are used to grow in indoor atmosphere frequently by the people. But the knowledge of plant cultivation with nutrient water medium will encourage them to cultivate economically important plant species. Not at very large scale but somehow slight load from the shoulder of farmer would be condensed inside home environment of the society. Desert and land with low water availability can also be used for horticulture activity with minimum requirement of water and nutrient sources (Thompson, 1978) .

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