

Design and Fabrication of Automated Natural Fertilizer and Dispensing in Hydroponic Unit

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Abstract— In Agriculture, proper growth of plants depends on essential fertilizers and nutrients. Nutrients are naturally available in some areas, but it is not available in some areas. The main purpose of fertilizer is to supply the essential nutrient to the plants. The fertilizer supply nutrient to nutrient deficient area. One of the important aspects in fertilizer is production. The production of natural fertilizer is manual process. Because producing such natural fertilizer is tedious process for large acre supply. Automating of such fertilizer leads to high production. This fertilizer machine will help in increasing the production. Hence we need to know the nutrient amount in the soil. The nutrient plays an important role in plant growth and health. Different soil contain different nutrient. Soils major essential nutrient is nitrogen, phosphorous, potassium. This nutrient determines the soil quality. The recent emerging technique for high production in agriculture is hydroponic system. This system will help in increasing the production of products. This system will run through water. Water is the major element. There is no need for soil to grow plant in this system. Hence the fertilizer produced is directly passed through the hydroponic system. The essential nutrient is supplied to plants. Hence the plant receives necessary nutrients. Through the water or fertilizer are dispensed to ground for ground water harvesting. This system helps in higher increasing production area and make healthy product. This machine will avoid use of chemical fertilizer.

Key words: Natural Fertilizer, Hydroponic System

I. INTRODUCTION

The natural fertilizer production can be produced automatically using controlled machine. This machine will help in producing different kind of fertilizer. Depending upon the fertilizer, machine feedback is altered. This will be a definitely hygienic method to produce the fertilizer. This is a natural fertilizer producing machine. After the production of fertilizer, quality is an important thing. The quality can be checked using the sensor, which measures the nutrient content in fertilizer. The main objective of this project is to automate the machine producing natural fertilizer. This machine helps in producing the natural fertilizer in large amount. Amirthakaraisal and panjakaviyam can both be prepared in this machine with the timing control. The raw materials are poured into the tank and stirred using motor at regular interval timing. The raw material is split-up and poured into necessary tank for panjakaviyam and amirthakaraisal. After producing the fertilizer, is mixed up with the water in the ratio of 1:10. Then the mixed fertilizer is transferred through soil with the help of hydroponic system. This system will help in increasing the production of products. This system will run through water. Water is the major element. There is no need for soil to grow plant in this system. Hence the fertilizer produced is directly passed

through the hydroponic system. The essential nutrient is supplied to plants. Hence the plant receives necessary nutrients. Through the water or fertilizer are dispensed to ground for ground water harvesting. This system helps in higher increasing production area and make healthy product. This machine will avoid use of chemical fertilizer. In recent years, a lot of research has been done in the area of agriculture to improve the production using fertilizers. But important aspect is that method carried by them is artificial. The natural method which is rich in nutrient content and it is in rare research. The main objective is to make automation in nature farming. Fertilizer and nutrient are important in nature farming. This machine helps to obtain the nature farming technique. Hence this technique will help in future natural farming.

II. DESIGN

The automated natural fertilizer machine and sensor consists of the following components:

- Hardware system
- Software system

A. Hardware system

Hardware system consists of following components

- DC motor
- Stepper motor
- Container
- Microcontroller
- H – bridge
- Battery
- Breadboard
- Pump
- Solenoid valve
- Relay module

B. Automatic Fertilizer Machine

The fertilizer machine will be controlled system using micro controller. Thus the machine uses DC motor, stepper motor, L293d motor drive, arduino, rack and pinion mechanism. Through this machine will run automatically. The time control can be controlled using arduino. The schedule production can be obtained. This machine will be altered to different fertilizer by changing the program.

C. Construction

The machine will be constructed through following steps:

- Two containers are fixed constantly and one is filled with water.
- Two stepper motor is used and it is attached with the rack and pinion
- Dc motor is attached with the rack and pinion mechanism.
- Hence arduino uses L293d IC drive to control the motor

- Stirrer is attached to dc motor

D. Working Principle

The machine needs continuous rotation in both clockwise and anti-clock wise direction. The fertilizer needs continuous rotation for its micro-organism formation and nutrient enrichment. The machine will work through following steps.

- 1) DC motor will help in continuous rotation and can be rotated in high speed.
- 2) Stepper motor moves the rack and pinion.
- 3) First of all, the Dc motor is moved to container and rotated in both clock wise and anti-clock wise direction for certain minutes.
- 4) After rotation, the DC motor is taken upward.
- 5) The DC motor is taken further to another container and dipped in it.
- 6) The second container contains water to clean the stirrer.
- 7) This will be cycle process.
- 8) It process one after another at regular time interval.
- 9) The microcontroller will be programmed according to the different fertilizer.
- 10) Programming will be done using arduino software.
- 11) Hence the machine will run according to the program.

E. Software System

Arduino Code Sketch

```
#include <Servo.h>
Servo myservo;
int d = 4;
int dc1 = 5;
int dc2 = 6;
int dc3 = 7;
int dc4 = 8;
int d1 = 9;
void setup()
{
  pinMode(d, OUTPUT);
  pinMode(dc1, OUTPUT);
  pinMode(dc2, OUTPUT);
  pinMode(d1, OUTPUT);
  pinMode(dc3, OUTPUT);
  pinMode(dc4, OUTPUT);
}
void loop()
{
  for(int i=0;i<3;i++)
  {
    motor();
    delay (5000);
  }
  void motor()
  {
    analogWrite(d1,222);
    digitalWrite(dc3, HIGH);
    digitalWrite(dc4, LOW);
    delay(2000);
    digitalWrite(dc3, LOW);
    digitalWrite(dc4, LOW);
    delay(2000);
```

```
analogWrite(d,222);
digitalWrite(dc1, HIGH);
digitalWrite(dc2, LOW);
delay(5000);
digitalWrite(dc1, LOW);
digitalWrite(dc2, HIGH);
delay(5000);
digitalWrite(dc1, LOW);
digitalWrite(dc2, LOW);
delay(2000);
digitalWrite(dc3, LOW);
digitalWrite(dc4, HIGH);
delay(2000);
digitalWrite(dc3, LOW);
digitalWrite(dc4, LOW);
delay(2000);
}
```

III. CONCLUSION

Fertilizer is important aspect in agriculture to increase the nutrient quantity. The chemical fertilizer turns to affect the plants natural process. This machine helps in producing the natural fertilizers. The natural fertilizer will increase the plant nutrient content. The fertilizer machine increases the soil major nutrient such as nitrogen, phosphorous, potassium. This essential nutrient increases the production. The machine tend to produce the large quantity fertilizer. The fertilizer will be used in hydroponic system. This will maintain nutrient quantity to the plants.

Nutrients are naturally available in some areas, but it is not available in some areas. The main purpose of fertilizer is to supply the essential nutrient to the plants. The fertilizer supply nutrient to nutrient deficient area. One of the important aspects in fertilizer is production. The production of natural fertilizer is manual process. Because producing such natural fertilizer is tedious process for large acre supply. Automating of such fertilizer leads to high production. This fertilizer machine will help in increasing the production. Hence we need to know the nutrient amount in the soil. The nutrient plays an important role in plant growth and health.

Though this project has many advantages, it also has some demerits which will be overcome in future works. The future work involves in advancement of the proposed machine and making it more user friendly.

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