



# Implementation of Forward Chaining Estimation of Ideal PH for Plant



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‘Jika Kamu tidak dapat menahan lelahnya belajar,  
Maka kamu harus sanggup menahan perihnya Kebodohan.’  
Imam Syafi’i

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## Abstract

Hydroponics is a method of planting crops through a medium of water that can live indoors or outdoors, hydroponic plants using NFT techniques (Nutrient Film Technique), where water and nutrients can circulate through plant roots. PH is the measurement of nutrient solution in acid or base state. Water pH can affect plant growth rates in hydroponic cultivation. In the PH study can survive at the value of 5.6-5.7, but some plants require different PH values. Therefore, a tracking is needed to determine the ideal plant type used in PH value between 5.6-5.7. This study aims to determine the ideal PH for plants on hydroponics. Forward Chaining is a forward search that begins to collect some facts by searching for the same rules with the existing hypothesis to the conclusion. This model is used to determine the type of plant in hydroponics that corresponds to PH that can survive in previous studies. Observations showed good PH values for hydroponic plant species. This research is used to find out the ideal PH for plant type in hydroponics using Forward Chaining method.

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# Chapter 1

## Related Works

Your related works, and your purpose and contribution which must be different as below.

### 1.1 Same Topics

#### 1.1.1 Topic 1

Research by S. Tu PH (4.5 - 8.0) is used to understand individual and interactive effects. Plants and P and As uptake are influenced. Phosphorus is inhibited As the uptake at all for the Fern crop has a PH value of 5.87. [24], according to Sean D. water idea with PH 5.8 (standard hydroponic control condition for lettuce), with PH state raised to pH 7.0, and nutrient solution using water with high alkaline. Adjustment to PH is performed daily using 1 mol / L KOH or 1 mol / L HNO<sub>3</sub>. [19] Research by the Liopa-Sakalidi assessment of the impact of PH in the growth of zucchini in hydroponics cultivation is carried out every second day from the 33 days after the zucchinis are transferred to the hydroponic system and up to 68 days after planting Each time the dimensions and weight of the plant are measured, and females, length and width of fruit stalks and total dissolved solids of fruit. [16] Plant growth rates did not differ between nutrient solutions, but fertilized plants with high low pH solutions had greater greenish leaves and approached higher mean heights than fertilized plants with high pH solutions. [3] The trials of 15-day type lettuce seedlings (*Lactuca Sativa* 'Sucrine', Semailles, Faulx-Les-Tombes, Belgium) were put into hydroponics and harvested after 36 days. The hydroponic system is filled with a 100 L fresh solution each week to maintain a stable nutritional condition for better reproducibility and comparison between treatments. The nutrient content of the water from the one-week solution was sampled for analysis before the spill, and another sample of the fresh



solution was taken immediately after refill. [9] According to Vandam plants grown in hydroponics over an 8-week period at Tanjung Peninsula University of Technology. Treatments of pH 4, pH 6 and pH 8 at 31, 90, 150 and 210 ppm of phosphorus were received by 12 groups of plants and replicated 10 times. The results showed that at pH 4, P fertilization significantly ( $P \leq 0.05$ ) induced higher chlorophyll production of *S.* plants grown on hydroponics than other pH treatments (pH 8 and pH 6). [26] Spinach (*Spinacia oleracea* cv Carmel) is grown in a conventional glass greenhouse under three different nutritional treatments. The lighting conditions and temperature are identical. Six growth systems were used to provide a duplicate bar system for each of these three treatments. Six trials are harvested from each system for a period of two months. Two treatments received hydroponic nutrition input, with one treatment at pH 7.0 and the other at pH 5. [5] The results of this study indicate that we can obtain optimal results and nutritional composition of leafy vegetable leaves grown on the substrate is well buried [12] hydroponic growth based on PH and environmental conditions for hydroponic growth Vegetables are a key factor that controls root development. [23] In this context, the motivation to apply the control of water sources of drip irrigation and nutrient solution to grow Daniela tomatoes based on hydroponic farming and Continuous variable monitoring using PH, and further monitoring may be seen through the web, in order to incorporate new technology to assist in decision making quickly. [2] It is important to identify an effective buffer chemical capable of adjusting the pH of the nutrient solution to the desired level for the production of the best hydroponic crops. Experiments were conducted to test the pH dynamics of altered nutrient solutions with various inorganic acids during hydroponic production and yield and nutritive quality of the resulting plants. The typical nutrient solution (pH 8.2) was adjusted to pH 5.6. [29] Among the studied nutrients studied (N, P, and pH), increased phosphorus concentrations significantly increased the number of tubers of potato crops in the hydroponic sand culture. These nutrients improve net photosynthesis. [8] In this study, experiments with four levels of a nutrient solution of pH control of the upper limit were conducted to explore the optimal pH nutrition management scheme under hydroponics by evaluating the character of the nutrient solution, e.g. pH. [28] Blueberries are one of the few horticultural crops adapted to grow in acid soils. To assess the molecular mechanism, planted at a neutral pH of 6.5 and at a preferred pH of 4.5. [18] PH is evaluated every 2 days. Regarding the variation of pH of the nutrient solution, on transplantation day, pH values were 5.5 and 5.43 respectively in treatment with freshwater and brackish water. The PH value

oscillates within the range recommended for hydroponic cultivation and correction is performed when necessary.[22]

## **1.2 Same Method**

write and cite latest journal with same method

### **1.2.1 Method 1**

The Forward Chaining method is a search method or a front tracking technique which begins by providing existing information and combining several rules to produce a conclusion or goal. [4] Forward Chaining is also called a search technique that begins with known facts, then compares. [15] This system instils expert systems using forward chaining methods to find out the solution of the nutritional conditions of the plant. [20] This system uses forward chaining method which means using some rules and actions to support using forward chaining method. [13] The operation of this forward chaining system begins by incorporating some known facts into working memory, and then generates new facts based on the premise rules which are then combined with some known facts. [11] This process continues until it reaches the goal or no longer regulates the premise in accordance with known facts. [14] The forward chaining method is implemented on an expert system inference engine.[6] Inference engine expert system is a computer program that answers questions from users. It processes all information from the knowledge base by shouting rules and facts. [17] One example is, for example, the proposed expert system already has a target disease (the main purpose) and then requires a set of rules to prove whether the target disease exists or not otherwise. This method of reasoning is recommended to use in expert systems as it may be of concern in the Diagnosis of a disease or a pest selected by plants. [21] Furthermore, grape growth is divided into eight stages as delayed sleep, budding period, rapid shoot growth period, and blooms into periods of veraison, veraison period, harvest period, post-harvest period and period of inactivity. For weather conditions, the three functional membership temperatures are defined as hot, warm and cold; the membership function for rainfall is defined as heavy, medium and light; and the membership function for moisture is defined as high, medium and low. Rules for Estimating the probability of Occurrence and the spread of pests and diseases of wine If Warm and High Humidity And High Temperature. [7] Forward chaining signifies the subject for the stages of doing the process as well: (step 1) e.g. inserting parts 1 and 2 together, then step 2 place 1, 2, and 3 together are referred

to as criteria, then step 3 place 1, 2, 3, and 4 together, next step is step 4 place part 1, 2, 3, 4, and 5 together 1 and 2, 3, 4, 5 [27] The Knowledge Representation Model is a model of knowledge representation used in this case. The system is based on production rules using IF-THEN patterns. Each symptom has determined the value of the weights (confidence factor) defined by the domain expert in the range of 0 ... 1, The example of forwarding chaining rule is as follows:

Rule 1: IF (Today Ali is fasting)

THEN (Ali hungry)

Rule 2: IF (Today Ali is fasting)

THEN (Ali tired) [30]

First example: Grape growth is divided into eight stages as delayed sleep, budding period, rapid shoot growth period, and blooms into periods of veraison, a period of veraison, harvest, postharvest period and period of inactivity. For weather conditions, the three functional membership temperatures are defined as hot, warm and cold; the membership function for rainfall is defined as heavy, medium and light; and the membership function for moisture is defined as high, medium and low. Rules for Estimating the probability of Occurrence as well as the dissemination of pests and diseases of wine If Warm and High Humidity And High Temperature. [1]

The second example by using the premise if and then: IF the name of the plant is pigeon pea then the stage of harvest is named podding, as well as the affected plant part is named after the pod, as well as eating habits is biting, and chewing is called the type, and Pest identification symptoms are larvae without white feet, brown pupa and black adult a flying. NEXT Insect Pests - Pod flies If the rule criteria include the symptoms or explanations of the pest (questions and answers). The bottom of THEN criteria is the rule that states the insect pest itself (diagnosis).[25] The process is similar to the human thinking process. Naturally, when performing a diagnosis, the first Symptom (or condition) is observed by the doctor then The problem is categorized and diagnosed. In the above example, the name of the plant, the stage of harvest, the affected part of the plant, the eating habits and the symptoms of pest identification represent questions, green beans, podding, pods, biting and chewing species and larvae without white feet, brown pupa and adult black fly.[10]

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