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To enhance vegetable cropping production by using drip irrigation in summer along with the safety of farmers and wildlife.

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Abstract : -

Located in the western part of Kolhapur district Bhudargad, Radhanagari, Chandgad, Gaganbawda, and PanhalaTalukas have a largely agricultural area with abundant water and reserved forests. Due to the geographical structure, these Talukas receive heavy rainfall and the groundwater level has improved due to the increase in the number of dams and K-T dams. Groundwater levels are used sparingly or may not use for agriculture from June to November but groundwater is used extensively from December to May. In the pursuit of higher incomes, farmers in the region are constantly watering their farms on the one hand, and on the other hand, there is a growing conflict between farmers and nocturnal nomads. Due to a shortage of food and drinking water in the forest during March, April, and May, wild cows and buffaloes go out of the forest at night in search of food and water. The experience of the farmers has shown that the herds enter the fields where the vegetables are grown and enjoy the delicious food. Due to this situation, farmers in the region are not able to grow vegetables in their fields even if they want to. The main objective of the project is to create a fully smart automation unit based on IOT technology to prevent the entry of wild cows and buffaloes from nearby forests into vegetable farms and to distribute water proportionately according to the availability of planned electricity in the region. The planned project work's experimentation will include Raspberry Pi, Solenoid valve, ESP8266 Module, Liquid Level Sensor, PIR Sensor, Current Volt Sensor, Temperature Sensor, Relay, Buzzer, LED, Drip Network, Motor, Database, and Online Web Application. Based on on-site survey database will be created, by reading databases amount of water will be supplied with the help of drip irrigation also live object detection with notification and buzzer playing and turning on LED for farm protection.

Keywords: sensor-based controlling; rule-based decision-making database; internet of things; Raspberry Pi; ciphering algorithm A5; I2C algorithm

1. Introduction:-

It is important to have a variety of leafy vegetables in your life as they provide the body with nutrients and vitamins. As computers and mobiles are an important part of life, their use has become important but their use is also causing eye injuries. Therefore, the consumption of vegetables has become very important. Due to the increase in population, the production of vegetables is very low. In the past, families deliberately used vegetables in their fields for their daily consumption, but this is no longer the case. When vegetables are grown in the field, the use of less water and the cultivation done can save the farmland.

Due to forest cover in Bhudargad, Ajara, Chandgad, Radhanagari, Gaganbawda, and PanhalaTalukas of Kolhapur District, most of the farms are close to the forest area. Crops like vegetables are very dear to the wild cows and buffalos, so farmers in this region avoid growing vegetables in their fields. If IoT technology is used to properly manage the water in the farms of the farmers in the region and protect the agricultural product in the fields then the farmers here will be ready to grow vegetables in large quantities.

2. Motivation:-

Electricity being used for agricultural purposes in the mentioned region at night, there have been many incidents of encounters of farmers and wild cows and buffaloes while watering the fields at night, thus endangering the biodiversity. Due to the attacks by wild cows and buffaloes at night, the farmers here turn on the water motor at night and turn it off in the morning out of fear. The wild cow and buffaloes enter the field at night to search for food and water, get frightened by the loud noises is the true case.

Considering the above incidents, it is necessary to create a new prototype to overcome the difficulties of the farmers in the region by using IOT technology, hardware devices, software, and databases together. With the help of which automated standardized water will be used in the field, the used water will be compiled in the transaction database which will make it easier to make future decisions, make full use of available electricity, supply water to the farm and prevent farm entry of farmer for watering and also prevent the entry of wild cows and buffaloes at night.

3. Literature Review:-

M.Suresh, S.Ashok, S.Arun Kumar andPuppalaSairam[1]The wireless soil moisture sensor used in the system developed by them will notify the ESP8266 module when the field moisture is low or high and then it is forwarded to the user's mobile application and guides the user to press the button in the mobile application to turn the motor on or off. It was mentioned that the daily moisture level in the field will be displayed on the user's mobile and will be stored in the database and used for future decision-making.

SehrishMunawarCheema, Museb Khalid, AbdurRehman and NadeemSarwar[2]A microcontroller in their systems grabs data from sensors and transmits it to the webserver where rule base analysis is performed to match between predefined conditions and the current state of plants grabbed through sensors. After mapping the conditions to rules average plant's feasibility rating is generated. Then values of sensors are processed on the server and a list of plants with their feasibility rating is sent to the user’s mobile. From where users can schedule watering of plants. When the date & time of the schedule arrives or the water level gets lower in the garden it notifies to the user to set the water pump in ON state by just clicking on a button in application from anywhere in the world. This is how it works.

K Balakrishna, Fazil Mohammed, C. R. Ullas, C. M. Hema and S.K. Sonakshi[3] Their prototype uses a Raspberry Pi processor, Wi-Fi module, Pi camera, ESP8266 module, LED, and

buzzer. With the help of the camera, the captured image will be sent to the controller and compared with the dataset, after match buzzer will be played and the light will be turned on. This is how it works. In the future work

of Their prototype, it is suggested that the application-based model should be created to achieve mobility and user-friendliness.

In September 2021, the Times of India [4] reported that a Police Patilof Shivdav village of BhudargadTaluka, District Kolhapur had confiscated the organs of wild animals. The rich biodiversity of Bhudargadtaluka has been repeatedly threatened by poachers. This is evident from this incident.

In February 2020, the Times of India [5] reported that a young farmer from Kale village of PanhalaTaluka, District Kolhapur had died in a bison attack. The incident took place in the evening. Increasing attacks of bison and evening time, It seems necessary to consider.

In December 2019, the United Nations of India [6] reported that two farmers from Harpawade village of Panhala, District Kolhapur had been severely injured by wild cows in the early hours of the morning. From this news, you can see that the bison's circulation is due to the easy availability of water and food in the fields. And it is mainly seen at night and in the early morning.

In March 2019, the Times of Maharashtra [7] reported that a farmer from Hattivade village of AjraTaluka, District Kolhapur was severely injured when a cow attacked him in a field. An attack on a farmer by a wild cow kills the farmer or leaves him permanently disabled. It is a fact that such incidents happen constantly in the case of farmers living near forest areas of Kolhapur district.

In May 2017, Times of India [8] reported that a farmer and a journalist were killed in a bison attack in Akurde village of BhudargadTaluka, District Kolhapur, and the incident created panic in the area. It is clear from the news that farmers are avoiding going to the fields and people are trying to reach home before dark as bison are seen in the area in the evening.

In May 2017, the Times of Maharashtra [9] reported that a farmer and a journalist were killed in a bison attack in Akurde village of BhudargadTaluka, District Kolhapur, and the incident created panic in the area. Also, a day before the incident, a farmer from the neighboring village of Shengaon was hit and seriously injured by a bison and a herd of bison in the same village caused severe damage to crops. It has been observed that many farmers have expressed the feeling of being reborn after saving their lives in this incident.

In May 2016, the Times of India [10] reportedthat a total of eight goats belonging to two farmers in Aralgundi and Mahagond of BhudargadTaluka, District Kolhapur had been eaten by leopards. The fact that the incident took place at night shows that the wildlife in the area is endangered and the lives of the farmers are in danger.

In March 2014, the Times of India [11] reported that in one year, 25 farmers in Kolhapur district were severely injured by wild bison and seven farmers were killed. Bhudargad, Radhanagari, Panhala, Chandgad, and AjraTalukas in Weston valley are forested and from this forest area wild bison, elephants, tigers, and cheetahs are roaming in agricultural areas close to forests so farmers' lives are in danger. This is something you should keep in mind.

In January 2007, One India Newspaper [12] reported that a woman farmer from Kardwadi village of BhudargadTaluka was killed in a bison attack, and a young farmer from Bazar Bhogaon of PanhalaTaluka was seriously injured in bison attack. These incidents happen frequently, very few of which are underlined in the newspapers. Therefore, this conflict between humans and wildlife needs to be resolved with the help of technology.

Jain Irrigation System[13]mentioned the importance of drip irrigation for the proper use of water and the materials required for it was learned.

4.Problem Statement :-

To enhance vegetable cropping production by using drip irrigation in summer along with the safety of farmers and wildlife.

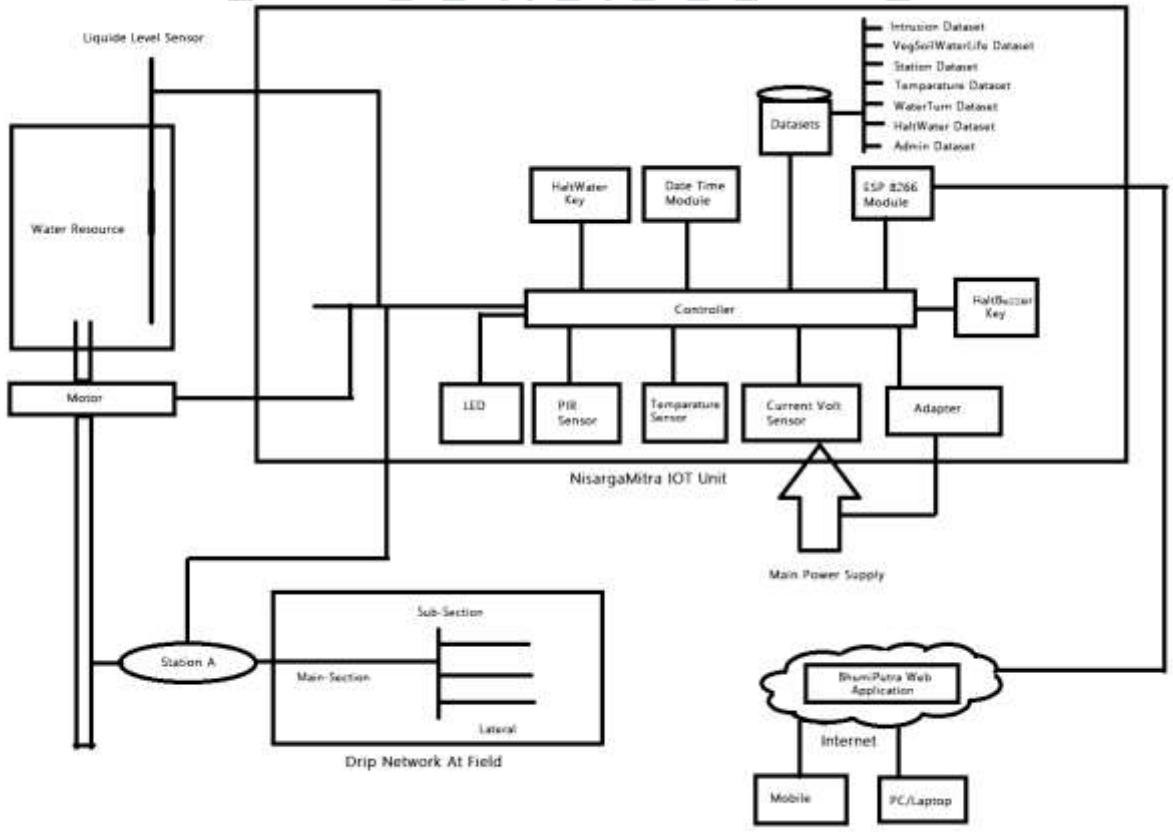
Objectives -

1] To develop a prototype to validate water turn in terms of accuracy and efficiency for the period from December to May.

2] To enhance vegetable production in the period from December to May with priority to the safety of farmers and wild animals.

3] To deploy said system in a geographically similar area after successful implementation.

5. Proposed Work :-



Proposed System Architecture

To control the selected one-acre area, a solenoid valve will be added and the main pipe of 3 inches, subsection pipes of 2.5 inches, and lateral pipes of 20 mm will be connected to create a network of drip irrigation inside it.

NisargaMitraIoT unit is comprised of keys, sensors, modules, LEDs, and a buzzer. The action of his work will be done by analyzing the datasets record and verifying the data obtained with the help of sensors.

The electricity will be checked with the help of current volt sensors and then with the help of a water level sensor the water level in the water resource will be ascertained.

It will be decided to increase the water turn by some minutes by comparing the data obtained with the help of a temperature sensor with the generated database.

To activate the system of ringing buzzer and turning on LED when the intrusion is detected by PIR sensor.

The watering turn will be stopped by pressing the HaltWater key after a sudden rain and watering will be continued by releasing the halt key when proper conditions are created, the buzzer will be sounded while tillage is being done in the field, it will be possible to stop the buzzer by pressing the HaltBuzzer key till the fieldwork is done and also statistics created for water turn, halt situation, intrusion detection by NisargaMitraIoT unit will be presented on the web app named BhumiPutra with the help of ESP8266 module.

Comparison between existing system and proposed system-

Existing System	**Proposed System**
This system is based on open water supply without any farm protection.	This system will be based on drip irrigation water supply with farm protection.
Uncontrolled water is pumped out to watering the farm by this system.	Controlled water will be pumped to watering the farm through this system.
In this system, it is not possible to protect the farmer from wild animals.	In this system it is possible to protect the farmer from wild animals.
Uncontrolled pumping of water in this system is causing unnecessary electricity bill and maintenance bill.	The system will pump controlled water and reduce electricity bills and accordingly maintenance bill.
This system requires a motor driver and a support man.	The Without Human interface will work in this system.
The human interface in this system is expensive.	Since this system does not have a human interface, that cost will get deducted.
Due to untimely water turn in this system, the farmer gets mental and physical fatigue.	The water turn in this system willbe done automatically so that the farmer is not bothered.

Existing System	**Proposed System**

Excessive water supply to the farm in this system raises serious issues related to agriculture.	The moderate supply of water to the farm through this system will not cause any serious problems related to agriculture.
In this system, important elements of the soil are being carried away with water, so that the farm land is becoming infertile at a fast pace.	In this system the erosion of farm land by water will be stopped.
This system is causing salinity in the fields and increasing the chances of desertification of the fields in future.	Due to this system it is not possible to get salt in the field.
Due to this system the excess water in the field is affected by chemical fertilizers and pesticides and such water can contaminate the nearby reservoir. This water can be dangerous to humans and other animals.	This will unlikely to happen in this system.
Precious water is wasted and water abstraction is wasted due to bursting of burrows and dams created by rats and crabs.	This will not possible in this system.
Due to this system, the amount of weeds in the field increases as the farmland gets more wet and hence the cost of weed removal increases.	The rate of weed formation in this system will be very low.
Due to this system more water flows in the field and weed seeds are spread all over the field and the cost of splitting increases.	This will not possible in this system.
In this system, there are frequent incidents of water seeping from the field and infiltrating the nearby farmer's field and taking away unnecessary water, affecting other activities in the neighboring field.	This will not possible in this system.
Due to this system, there is a high incidence of disability or death due to fight with snake bites or wild cows while watering the fields at night.	This will not possible in this system.

Existing System	**Proposed System**

Existing system is not efficient on sandy soils; water soaks in before it reaches end of field	Proposed system will be efficient to all types of soils
Difficult to apply small amounts (< 1 acre-inch) of irrigation water	This will not possible in this system
Building and taking down levees is labor intensive	This will not possible in this system
This is not possible in this system	Mowers and trimmers can slice tubing
It is not possible to distribute the pesticide evenly in the field without any difficulty.	It will be possible to spread the agricultural drug evenly in the field without any hassle
In this system human entry may have a risk of electrical hazards.	This will not possible in this system
It is difficult to take full advantage of the available electricity on any time slot to give a water turn	Water turn will be given without any difficulty by taking full advantage of the available electricity on any time slot
Since log entry is not created in this, further planning is done roughly.	Water turn's log entry and intrusion log entry will be useful for further planning study
In this system, disputes between humans and wild animals occur easily	This system will help to stop the conflict between humans and wild animals
Maintenance is not required to keep system going	Proper maintenance will required to keep system going
This will not possible in this system.	This system will include data reporting and alert system. This will put an end to doubts and suspicions among the consuming farmers.

Scope -

To obtain and analyze the results in one-acre land near the forest at Shivdav village of BhudargadTaluka, District Kolhapur by installing the proposed system.

A. Methodology

1] Module 1 –Development of System and analyzing data

First of all, a network of drip irrigation will be set up in the selected one-acre farm. For this, the main pipe section of 3 inches, subsection pipe of 2.5 inches, and lateral pipes of 20 mm will be used. Between each lateral, the distance will be four feet. The entire drip irrigation network will be included inside the station (Solenoid Valve).

To control the station and to provide farm protection there will be proposed firmware named NisargaMitra and this firmware has a system program that will be developed by Python language and will be based on the Waterfall model.

NisargaMitra will do the following tasks in sequence on every day to give a water turn.

1] Current volt sensor s will be used to verify the availability of electricity.

2] Water level sensor will be used to verify the availability of proper water level in the water source.

3] Will ensure that the OFF-value is available in the HaltWater dataset.

4] One of the stations will be selected from the Station dataset with its total water turnaround time.

5] If the temperature is higher than the base temperature, total water turnaround time of the selected station will be modified with increased time. This working decision will be made by comparing the temperature data with the temperature dataset.

6] Total water turnaround time will be referred to turn ON the selected station and motor.

7] The motor and station will be turned off after total water turnaround time is over.

8] After completing the water turn for the selected station, its log entry will be recorded in the WateTurn dataset.

Note - If there is a power outage during the water turn, the rest of the water will be supplied during the whole day when the power is on.This process will be the same for the rest of the station.

With thatNisargaMitra will do the following tasks in sequence on every day for farm protection.

1] PIR sensor will be used to detect intrusion of live object in the farm.

2] Turn on the buzzer from the time the intrusion is detected until it goes away. If this work is done at night, turn on the LED with the buzzer.

3] Store log entry of intrusion detection in Intrusion dataset and alerting the farmer through SMS.

In addition, the entry of water turn and the entry of intrusion detection will be stored in the WaterTurn dataset and Intrusion dataset respectively and will be synchronized with the database of the web app with the help of ESP8266. This will be further used by Fetching and Recommendation module.

Module 1 is strictly recommending the use of a drip network under every station and NisargaMitra firmware's system program will work on analyzing the sensor's data by using created datasets. These datasets will be created based on information obtained from the Internet.

2] Module 2 –Fetching &Recommendation

A web app called BhumiPutra will be created to store and update datasets for NisargaMitra firmware as well as to make recommendations for registered farmers with the help of datasets.

The administrator of BhumiPutra will be the owner of the water supply scheme. The administrator will perform the following tasks.

1] Register yourself with Unique Identification and Login Credentials.

2] Each farmer will register with his personal information, land type and crop type in Station dataset.

3] According to the land type, each vegetable crop will register in the VegSoilWaterLife dataset with its daily water demand and the total number of days to water it.

4] Temperature and its subsequent water turnaround time will register in Temperature dataset with land type information.

5] Will register pesticides as per crop life.

6] In case of sudden rain, set the ON-value in HaltWater dataset to stop the water turn and then set the OFF-value to continue the water turn.

Bhumiputra's users will be farmers registered under each water scheme. After selecting the owner of the water supply scheme at this place, belonging farmers will be able to see the created log entries by NisargaMitra for WaterTurn and for intrusion detection. It will make recommendations for each station on what crops the farmer can grow in his field

from March to May and what pesticides should be applied according to the current crop life in the field. It will also recommend how often intrusion has been detected in the fields inside each station and in what period the intrusion was high. This work of recommendations will be done with the help of BhumiPutra web application as per the records in the datasets created.

The Bhumiputra web application will be developed with the help of PHP technology and will be based on the Waterfall model.

For alerting farmer NisargaMitra will place first SMS to farmer's mobile on intrusion detection and then place second SMS with information on how long intrusion was in the field after removal of intrusion.

3] **Module 3 – Experimental result and analysis**

After installing the proposed system in the selected one-acre area, it will be verified whether the on-demand water supply is provided and whether its log entries are generated. It will also verify whether intrusions are detected in the selected field and whether the intrusion removal system is working successfully as well as whether log entry of intrusion detection is generated. Analysis of intrusion of wild animals, alerts generated and its effect to be mentioned here.

Successful verification of both these factors will result in an increase in the yield of the crop compared to the previous production. After the use of the proposed system, the result analysis will be done by comparing the electricity bill and the cultivation bill with the previous bill. The BhumiPutra web application will be used for this entire task. The BhumiPutra web application will present you a comparative difference between the existing system and the proposed system using available data through Bar graphs and Pie charts.

After successful experimentation of the proposed system, its use will be encouraged in the agricultural areas adjoining the forest areas like Chandgad, RadhanagariShahuwadi, Gaganbawda, and PanhalaTalukas of Kolhapur district. It will also be followed up in other parts of the state with similar geographical conditions. The analysis & its report will be forwarded to forest department or state Government for further effectiveness.

Benefits by proposed system-

1] Giving the crop as much water as it needs will reduce the cost of Electricity.

2] The weeds in the field will be stopped and the cost of cultivation will be reduced.

3] Field salting, infiltration of water in the neighboring fields and obstruction to cultivation will be stopped.

4] In unmanned fields it will be possible to give water turn at any time when electricity is present.

5] Snake bites incidents and wild bison attack incidents to farmer, which are often happening at night time on field, will be stopped.

6] Preventing the entry of pets and wild animals in the fields with the help of NisargaMitra will not harm the biodiversity and will also provide protection to it.

7] By reducing the cost of cultivation and providing farm protection, it will be possible to increase agricultural production.

8] The farmer can see the water turn and intrusion entry in his field with the help of a user-friendly web application named BhumiPutra, which can be used very easily on both mobile and computer.

9] The proposed system is not limited to one farmer but is useful to multiple farmers and operates in a rule-based manner.

6. Facilities Available & Requirements

Hardware Requirement:

- Computer System with i3 processor or better, 4GB RAM
- Internet Connectivity
- Raspberry Pi Controller
- Sensors
- Relay
- ESP8266 Module
- Solenoid Valve
- Buzzer
- LED
- Keys
- Motor
- Drip Network

Software Requirement:

- Windows
- Python

- IDE/Framework- Pycharm
- PHP IDE

7. Plan of Work

Month	Work
September 2021	Collect Pre-requisite Information
October 2021	Module 1
November 2021	Module 2
December 2021	DP-1
January 2022	Module 3
February 2022	Module 3
March 2022	Paper Presentation
April 2022	Report Writing and Submission

8.References:-

1)M.Suresh,S.Ashok,S.Arun Kumar andPuppalaSairam,“ Smart Monitoring of Agricultural Field And Controlling of Water Pump Using Internet of Things “ in IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), March 2019, doi**:** 10.1109/ICSCAN.2019.8878801

2)SehrishMunawarCheema,Museb Khalid,AbdurRehman and NadeemSarwar, “ Plant Irrigation and Recommender System–IoT Based Digital Solution for Home Garden “In Bajwa I, Kamareddine F, Costa A. (eds) Intelligent Technologies and Applications. INTAP 2018.Communications in Computer and Information Science, vol 932.Springer, Singapore. https://doi.org/10.1007/978-981-13-6052-7_44

3)K Balakrishna, Fazil Mohammed , C.R. Ullas, C.M. Hema, S.K. Sonakshi“ Application of IOT and Machine Learning in Crop Protection against Animal Intrusion presented at Global Transitions Proceding “[Global Transitions Proceedings open access - Science Direct] doi: https://doi.org/10.1016/j.gltp.2021.08.061

4)https://timesofindia.indiatimes.com/city/kolhapur/kolhapur-forest-department-arrests-police-patil-seizes-wild-animals-claw/articleshow/85917586.cms

5)https://timesofindia.indiatimes.com/city/kolhapur/27-year-old-man-killed-in-bison-attack/articleshow/74165632.cms?from=mdr

6)http://www.uniindia.com/~/two-farmers-seriously-injured-in-bison-attack-in-kolhapur/States/news/1820065.html

7)https://maharashtratimes.com/maharashtra/kolhapur/maharashtra-farmer-seriously-injured-in-bison-attack-in-ajara-kolhapur/articleshow/68477939.cms

8)https://timesofindia.indiatimes.com/city/kolhapur/villagers-on-edge-after-bison-attack/articleshow/58693829.cms

9)https://maharashtratimes.com/maharashtra/kolhapur/attack-after-wild-animal-in-bhudargad/articleshow/58662189.cms

10)https://timesofindia.indiatimes.com/city/kolhapur/man-animal-conflict-leopard-kills-eight-goats-in-bhudargad/articleshow/52286332.cms

11)https://timesofindia.indiatimes.com/city/kolhapur/bison-attacks-claimed-seven-lives-highest-so-far-in-a-year/articleshow/32256989.cms

12)https://www.oneindia.com/2007/01/18/woman-killed-in-bison-attack-farmer-severely-injured-1169192245.html

13) http://www.jains.com

14)http://mahadiscom.com

15)https://en.climate-data.org/asia/india/maharashtra/kolhapur-4970/

16)https://www.almanac.com/when-water-your-vegetable-garden-watering-chart#