Agriculture Pest Control

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Abstract*:- Agriculture is the main occupation of TamilNadu people. Growers encounter the problems of colorful types of nonentity pests that harm crops and affect loss of productivity each time.Thus, it's necessary for growers to use fungicides to help crop damage. Still, when fungicides are used in large Volume, they beget adverse impacts on people, creatures and the terrain. Rather than using fungicides, the government has to support other ways to help nonentity pests, including the use of natural agents and some insects etc. This study aimed to develop Solar Energy-Grounded Nonentity Pests Trap by using ultraviolet light emitting diode tube to bait the nonentity pests and 12 volt battery as power force to light emitting diode tube.The battery charging system derives electrical energy from 10 watts of solar cell for use at night. This proposed Solar Energy-Grounded Nonentity Pests Trap has an automatic control system to bait nonentity pests when there's no sun and the system will be stopped when the sun shines.

I. INTRODUCTION

Agriculture is a top occupation in Tamilnadu. Every time growers face pest problems which seriously destroy crops. There are numerous forestallments and obliterations of pest problems, similar to mechanical systems, physical systems, natural systems, and chemical systems. Using fungicides and chemical systems directly affects agronomists and consumers, for illustration, pests are chemical resistant which leads to growing using further and further fungicides This causes factory residue which is dangerous for consumers, and also affects on terrain and ecology. At present, the consumers emphasize on safe and non-chemical food. The directors should be apprehensive of this matter and reduce fungicide to drop growers and consumer's health problems by creating non-chemical and fungicide measures. Also, cultivators have tried to find other ways Rather of chemicals used similar as using lights to tempt pests which is a popular way for growers. Still, that way is still a lack of electric energy for bulbs because the ranch is far down, and traps are also precious. From this point, the experimenter has developed Solar EnergyBased Insect Pest Trap for Vineyards and vegetables.

The original PIC was built to be used with General Instrument's new CP1600 16-bit CPU. While generally a good CPU, the CP1600 had poor I/O performance, and the 8-bit PIC was developed in 1975 to improve performance of the overall system by offloading I/O tasks from the CPU. The PIC used simple microcode stored in ROM to perform its tasks, and although the term was not used at the time, it shares some common features with RISC designs.

In 1985, General Instrument spun off their microelectronics division and the new ownership cancelled almost everything which by this time was mostly out-of-date. The PIC, however, was upgraded with an internal EPROM to produce a programmable channel controller. Today a huge variety of PICs are available with various on-board peripherals (serial communication modules, UARTs, motor control kernels, etc.) and program memory from 256 words to 64k words and more (a "word" is one assembly language instruction, varying from 8, 12, 14 or 16 bits depending on the specific PIC micro family).

PIC and PIC micro are registered trademarks of Microchip Technology. It is generally thought that PIC stands for Peripheral Interface Controller, although General Instruments' original acronym for the initial PIC1640 and PIC1650 devices was "Programmable Interface Controller". The acronym was quickly replaced with "Programmable Intelligent Computer".

The Microchip 16C84 (PIC16x84), introduced in 1993, was the first[citation needed] Microchip CPU with on-chip EEPROM memory. This electrically erasable memory made it cost less than CPUs that required a quartz "erase window" for erasing EPROM. By 2013, Microchip was shipping over one billion PIC microcontrollers every year.

II. EXPERIMENTAL

POWER SUPPLY UNIT BLOCK

All digital circuits work only with low DC voltage. A power supply unit is required to provide the appropriate voltage supply. This unit consists of a transformer, rectifier, filter and a regulator. AC voltage typically of 230Vrms is connected to a transformer which steps that AC voltage down to the desired AC voltage level. A diode rectifier then provides a full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variations. Regulator circuit can use this DC input to provide DC voltage that not only has much less ripple voltage but also remains in the same DC value, even when the DC voltage varies, or the load connected to the output DC voltage changes. The required DC supply is obtained from the available AC supply after rectification, filtration and regulation.

The main components used in the power supply unit are Transformer, Rectifier, Filter and Regulator. The 230V AC supply is converted into 9V AC supply through the transformer. The output of the transformer has the same frequency as in the input AC power.

This AC power is converted into DC power through diodes. Here the bridge diode is used to convert AC supply to the DC power supply. This converted DC power supply has the ripple content and for normal operation of the circuit, the ripple content of the DC power supply should be as low as possible. Because the ripple content of the power supply will reduce the life of the circuit. So to reduce the ripple content of the DC power supply, the large value of capacitance filter is used.

This filtered output will not be the regulated voltage. For this purpose IC7805 regulator IC is used in the circuit.

TRANSFORMER

Transformer is a device used either for stepping-up or stepping-down the AC supply voltage with a corresponding decrease or increase in the current. Here, a transformer is used for stepping-down the voltage so as to get a voltage that can be regulated to get a constant 5V.

RECTIFIER

A rectifier is a device like a semiconductor, capable of converting sinusoidal input waveform units into a unidirectional waveform, with a nonzero average component.

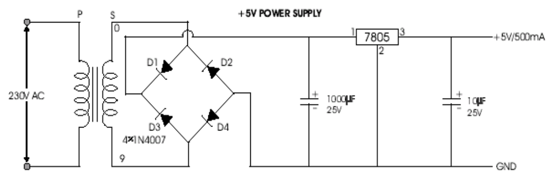
FILTERS

Capacitors are used as filters in the power supply unit. The action of the system depends upon the fact that the capacitor stores energy during the conduction period and delivers this energy to the load during the inverse or non-conducting period. In this way, time during which the current passes through the load is prolonged and ripple is considerably reduced.

VOLTAGE REGULATOR

The LM78XX is a three terminal regulator available with several fixed output voltages making them useful in a wide range of applications. IC7805 is a fixed voltage regulator used in this circuit.

Circuit diagram of such a power supply is as shown in Figure 1.



DIODES

APPLICATIONS–INTRODUCTION

SEMICONDUCTORS

Semiconductors are materials which are used to manufacture all electronic and optoelectronic devices, computer components, IC's (integrated circuits), mems (micro electro mechanical systems) and even nano devices (example quantum dot leds) today. They are so widely used because of their special band gap and its related properties. They even differ from conductors and insulators in their electrical and optical properties because of their band gap (E_g) being different from that of conductors and insulators. Now the band gap of a material is defined as the energy difference between conduction band and valence band in terms of electron energy. It is a major factor in deciding a material application for e.g. Conductors have no E_g, semiconductors have an E_g of the order of 1ev.

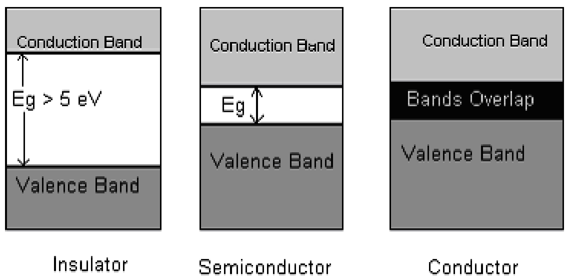


Fig. 3.1 Energy band diagram of an insulator, semiconductor and a conductor.

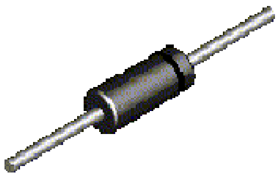
TABLE 3.1

	Insulators	**Semiconductor Si**	**Ge**	**Conductor**
Band Gap (ev)	> 5 ev	~ 1.1	~ 0.6	No band gap
Resistivity (ρ) (Ω cm)	10^{-12}	0.02	0,02 x 10^{-3}	10^{6}
n_i (cm $^{-3}$)	---	1.5 x 10^{10}	2.5 x 10^{13}	~ 10^{23}
Temperature coefficient of R	Positive	Positive	Positive	Negative

DIODES:

A diode is a two terminal device made by a P type and n type materials or between a semiconductor and a metal. If the junction is made between a metal and semiconductor then it is called a Schottky diode whose application is in rectifying and non-rectifying contacts and Schottky devices.

There are various methods of fabrication of a junction depending on the application of the diode.



DO-35

POTENTIAL BARRIER

When the pn junction is made, there is a transfer of charge through the junction region because of the concentration gradient of the charge carriers, as shown in fig 1.2. This creates a *barrier potential.*) The direction of barrier potential is as shown by the arrow from n type to p type**. It is the formation of potential barriers that makes the device useful since it can be controlled by various factors like biasing etc.**

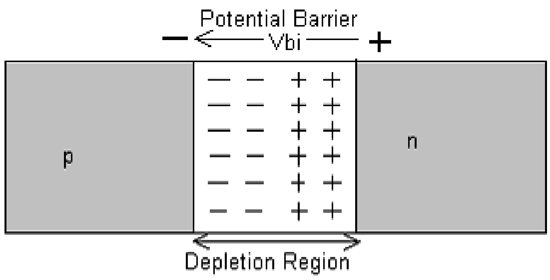


Fig. 3.2 Depletion Region consisting of uncompensated ions on both sides of the junction. The potential barrieier is from n side to p side.

BIASING

Forward Biasing: If an external voltage is applied such that the negative of the battery is connected to the n side and positive to the p side then V_{bi} will get reduced and more current can flow across the junction.

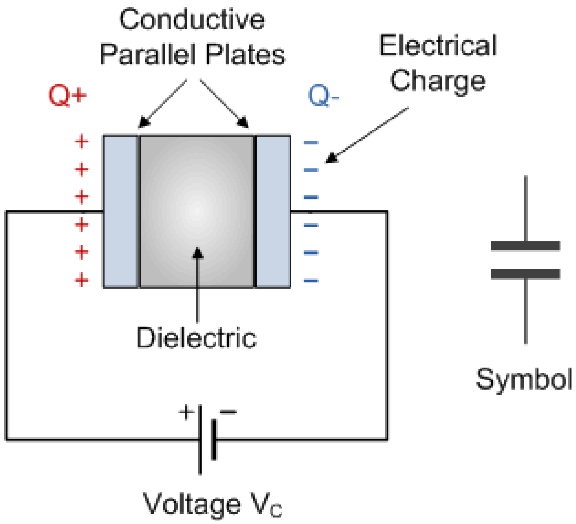
CAPACITOR

The capacitor is an element which has the capability or " capacity" to store energy in the form of an electrical charge producing an implicit difference (Stationary Voltage) across its plates, much like a small rechargeable battery. There are numerous different kinds of capacitors available from veritably small capacitor globules used in resonance circuits to large power factor correction capacitors, but they all do the same thing, they store charge.

In its introductory form, a capacitor consists of two or further resemblant conductive (essence) plates which aren't connected or touching each other, but are electrically separated either by air or by some form of a good separating material similar as waxed paper, mica, ceramic, plastic or some form of a liquid gel as used in electrolytic capacitors. The separating subcaste between capacitor plates is generally called the Dielectric.

Due to this separating subcaste, DC current can not flow through the capacitor as it blocks it, allowing rather a voltage to be present across the plates in the form of an electrical charge. The conductive essence plates of a capacitor can be square, indirect or blockish, or they can be of a spherical or globular shape with the general shape, size and construction of a resemblant plate capacitor depending on its operation and voltage standing.

The quantum of implicit difference present across the capacitor depends upon how important charge was deposited onto the plates by the work being done by the source voltage and also by how important capacitance the capacitor has and this is illustrated below.



Likewise, as the current flows out of the capacitor, discharging it, the potential difference between the two plates decreases and the electrostatic field decreases as the energy moves out of the plates. The property of a capacitor to store charge on its plates in the form of an electrostatic field is called the **Capacitance** of the capacitor. Not only that, but capacitance is also the property of a capacitor which resists the change of voltage across it.

THE CAPACITANCE OF A CAPACITOR

Capacitance is the electrical property of a capacitor and is the measure of a capacitors ability to store an electrical charge onto its two plates with the unit of capacitance being the Farad (abbreviated to F) named after the British physicist Michael Faraday.

Capacitance is defined as being that a capacitor has the capacitance of One Farad when a charge of One Coulomb is stored on the plates by a voltage of One volt. Note that capacitance, C is always positive in value and has no negative units.

VOLTAGE RATING OF A CAPACITOR

All capacitors have a maximum voltage standing and when opting a capacitor consideration must be given to the quantum of voltage to be applied across the capacitor. The maximum quantum of voltage that can be applied to the capacitor without damage to its dielectric material is generally given in the data wastes as WV, (working voltage) or as WV DC, (DC working voltage).

Still, the dielectric will break down (known as electrical breakdown) and arcing will occur between the capacitor plates performing in a short- circuit, If the voltage applied across the capacitor becomes too great. The working voltage of the capacitor depends on the type of dielectric material being used and its consistency. The DC working voltage of a capacitor is just that, the maximum DC voltage and NOT the maximum AC voltage as a capacitor with a DC voltage standing of 100 volts DC can not be safely subordinated to an interspersing voltage of 100 volts. Since an interspersing voltage has anR.M.S. value of 100 volts but a peak value of over 141 volts.

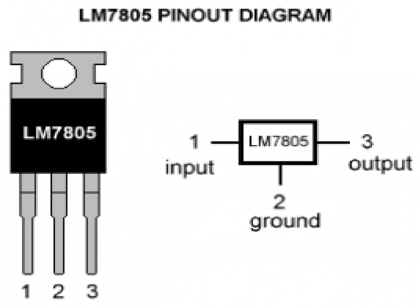
Also a capacitor which is needed to operate at 100 volts AC should have a working voltage of at least 200 volts. In practice, a capacitor should be named so that its working voltage either DC or AC should be at least 50 percent lesser than the loftiest effective voltage to be applied to it.

Another factor which affects the operation of a capacitor is Dielectric Leakage. Dielectric leakage occurs in a capacitor as the result of an unwanted leakage current which flows through the dielectric material. Generally, it's assumed that the resistance of the dielectric is extremely high and a good insulator blocks the inflow of DC current through the capacitor (as in a perfect capacitor) from one plate to the other. Still, if the dielectric material becomes damaged due inordinate voltage or over temperature, the leakage current through the dielectric will come extremely high performing in a rapid-fire loss of charge on the plates and an overheating of the capacitor ultimately performing in unseasonable failure of the capacitor. Also noway use a capacitor in a circuit with advanced voltages than the capacitor is rated for else it may come hot and explode.

REGULATOR 7805

Voltage sources in a circuit may have oscillations performing in not furnishing fixed voltage labors. A voltage controller IC maintains the affair voltage at a constant value. 7805 IC, a member of the 78xx series of fixed direct voltage controllers used to maintain similar oscillations, is a popular voltage controller integrated circuit (IC). The xx in 78xx indicates the affair voltage it provides. 7805 IC provides 5 volts regulated power force with vittles to add a heat Gomorrah.

All voltage sources can not give fixed affair due to oscillations in the circuit. For getting constant and steady affairs, the voltage controllers are enforced. The integrated circuits which are used for the regulation of voltage are nominated as voltage controller ICs. Then, we can bandy IC 7805. The voltage controller IC 7805 is actually a member of the 78xx series of voltage controller ICs. It's a fixed direct voltage controller. The xx present in 78xx represents the value of the fixed affair voltage that the particular IC provides. For 7805 IC, it's 5V DC regulated power force. This controller IC also adds a provision for a heated Gomorrah. The input voltage to this voltage controller can be over 35V, and this IC can give a constant 5V for any value of input lower than or equal to 35V which is the threshold limit.

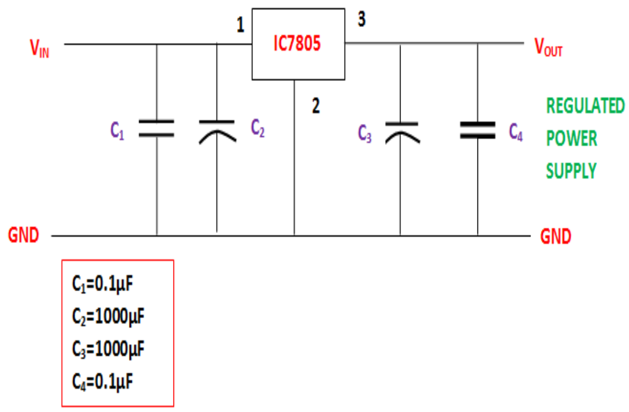


7805 IC Rating

- Input voltage range 7V- 35V
- Current rating $I_c = 1A$
- Output voltage range $V_{Max=5.2V}, V_{Min=4.8V}$

Regulated Power Supply Circuit

- The **voltage regulator 7805** and the other components are arranged in the circuit as shown in figure.



The purposes of coupling the components to the IC7805 are explained below. C_1- It is the bypass capacitor, used to bypass very small extent spikes to the earth. C_2 and C_3- They are the filter capacitors. C_2 is used to make the slow changes in the input voltage given to the circuit to the steady form. C_3 is used to make the slow changes in the output voltage from the regulator in the circuit to the steady form.

When the value of these capacitors increases, stabilization is enlarged. But these capacitors single-handedly are unable to filter the very minute changes in the input and output voltages. C_4- like C_1, it is also a bypass capacitor, used to bypass very small extent spikes to the ground or earth. This is done without influencing other components.

CORE ARCHITECTURE

The PIC architecture is characterized by its multiple attributes:

- Separate code and data spaces (Harvard architecture).
- A small number of fixed length instructions
- Most instructions are single cycle execution (2 clock cycles, or 4 clock cycles in 8-bit models), with one delay cycle on branches and skips
- One accumulator (W0), the use of which (as source operand) is implied (i.e. is not encoded in the opcode)
- All RAM locations function as registers as both source and/or destination of math and other functions.
- A hardware stack for storing return addresses
- A small amount of addressable data space (32, 128, or 256 bytes, depending on the family), extended through banking
- Data space mapped CPU, port, and peripheral registers
- ALU status flags are mapped into the data space
- The program counter is also mapped into the data space and writable (this is used to implement indirect jumps).

There is no distinction between memory space and register space because the RAM serves the job of both memory and registers, and the RAM is usually just referred to as the register file or simply as the registers.

SOFTWARE REQUIREMENT:

EMBEDDED C :

Embedded C is one of the most popular and most generally used Programming Languages in the development of Bedded Systems. So, in this composition, we will see some of the Basics of Bedded C Program and the Programming Structure of BeddedC.

Bedded C is maybe the most popular language among Bedded Programmers for programming Bedded Systems. There are numerous popular programming languages like Assembly, Drive, Cetc. that are frequently used for developing Bedded Systems but Bedded C remains popular due to its effectiveness, lower development time and portability. Before digging into the basics of Bedded C Program, we will first take a look at what an Bedded System is and the significance of Programming Language in Bedded Systems. [14-16]

EMBEDDED SYSTEM:

An Bedded System can be stylish described as a system which has both the tackle and software and is designed to do a specific task. A good illustration for an Bedded System, which numerous homes have, is a WashingMachine.We use washing machines nearly daily but would n't get the idea that it's an bedded system conforming of a Processor (and other tackle as well) and software.

Bedded Systems can't only be stand- alone bias like Washing Machines but also be a part of a much larger system. An illustration for this is a Auto. A ultramodern day Auto has several individual bedded systems that perform their specific tasks with the end of making them smooth and safe. Some of the bedded systems in a Auto areAnti-lock Braking System (ABS), Temperature Monitoring System, Automatic Climate Control, Tyre Pressure Monitoring System, Engine Oil Level Monitor, etc.

PROGRAMMING IN EMBEDDED SYSTEM:

As mentioned before, Bedded Systems consists of both Hardware andSoftware.However, the main Hardware Module is the Processor, If we consider a simple Bedded System. The Processor is the heart of the Bedded System and it can be anything like a Microprocessor, Microcontroller, DSP, CPLD (Complex Programmable Logic Device) and FPGA (Field Programmable Gate Array).

All these biases have one thing in common: they're programmable i.e. we can write a program (which is the software part of the Bedded System) to define how the device actually works.

Bedded Software or Program allow Hardware to cover external events (Inputs) and control external bias (Labors) consequently. During this process, the program for an Embedded System may have to directly manipulate the internal armature of the Bedded Tackle (generally the processor) similar to Timekeepers, Periodical Dispatches Interface, Interrupt Handling, and I/ O Anchorage Setc.

From the below statement, it's clear that the Software part of an Bedded System is inversely important to the Hardware part. There's no point in having advanced Hardware Components with inadequately written programs (Software). There are numerous programming languages that are used for Bedded Systems like Assembly (low-position Programming Language), C, C, JAVA (high-position programming languages), Visual Basic, JAVA Script (Operation position Programming Languages),etc.In the process of making a better bedded system, the programming of the system plays a vital part and hence, the selection of the Programming Language is veritably important.

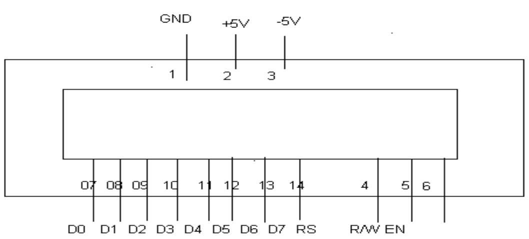
LIQUID CRYSTAL DISPLAY (LCD): -

An electric current passed through the liquid causes the crystals to align so that light cannot pass through them. LCD technology has advanced very rapidly since its initial inception over a decade ago for use in laptop computers. Technical achievements have resulted in brighter displacement, higher resolutions, reduced response times and cheaper manufacturing process.

This is due to following reasons:

The declining prices of LCDs.The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.An intelligent LCD display of two lines, 20 characters per line that is interfaced to the pic16f72 microcontroller.Incorporation of a refreshing controller into the LCD, thereby relieving the CPU to keep displaying the data. Ease of programming for characters and graphics.Most of the LCD modules conform to a standard interface specification. A 14-pin access is provided having eight data lines, three control lines and three power lines. The connections are laid out in one of the two common configurations, either two rows of seven pins, or a single row of 14 pins.One of these pins is numbered on the LCD's printed circuit board (PCB), but if not, it is quite easy to locate pin1. Since this pin is connected to ground, it often has a thicker PCB track connected to it, and it is generally connected to metal work at the same point.

PIN DIAGRAM OF LCD: -



PIN DESCRIPTIONS: -

Vcc, Vss and Vee: -

While Vcc and Vss provide +5V and ground respectively, Vee is used for controlling LCD contrast.

RS Register Select: -

There are two very important registers inside the LCD. The RS pin is used for their selection as follows.

If RS=0, the instruction command code register is selected, allowing the user to send a command such as clear display, cursor at home, etc.

If RS=1, the data register is selected, allowing the user to send data to be displayed on the LCD.

R/W, read/write: -

R/W input allows the user to write information to the LCD or read information from it.

R/W = 1 for reading.

R/W= 0 for writing.

EN, enable: -

The LCD to latch information presented to its data pins uses the enable pin. When data is supplied to data pins, a high–to-low pulse must be applied to this pin in order for the LCD to latch in the data present at the data pins. This pulse must be a minimum of 450 ns wide.

D0 – D7: -

The 8–bit data pins, DO – D7, are used to send information to the LCD or read the contents of the LCD's internal registers.To display letters and numbers, we send ASCII codes for the letters A–Z, a-z numbers 0-9 to these pins while making RS=1.There are also instruction command codes that can be sent to the LCD to clear the display or force the cursor to home position or blink the instruction command codes.We also use RS = 0 to check the busy flag bit to see if the LCD is ready to receive information. The busy flag is D7 and can be read when R/W=1 and RS=0, as follows: if R/W = 1, RS = 0. When D7= 1 (busy flag = 1), the LCD is busy taking care of internal operations and will not accept any information.[15-20].

III. RESULTS AND DISCUSSION

The main structure of Agriculture Pest Control is made from a sword for durable use in agrarian fields.Its height is 150 centimeters. On the top of Insect Pest Trap, install the 20 watts solar cells panel, size 45x45 cm, 10-15 degrees of elevation angle for solar effective.The base of the trap is sword plates to mount the ground. The nonentity's roof consists of a 30x40x15 (range x length x consistency) clear acrylic square box which can let LED light out of the box. There's a line mesh of an electronic mosquito trap on the bottom of the box. There are 150 LED sizes 7x7 mm; 5 rows of 30 LED bulbs each inside the box. Other effects are 5 amps battery bowl, 12 V 14 Ah Sealed Lead Acid Calcium battery, light detector switch circuit, and high voltage circuit of mosquito trap are set in sword box to help from any damages.Whenever the rainfall conditions to be detected by using the detector is to be connected to the fencing circuit, they're to be detected as humidity conditions, moisture, temperature.

IV CONCLUSION

1.Agriculture pest control research chose general materials to be adapted for pest trapping such as electronic mosquito trap and clear acrylic board. Then a simple design was created to easily teach farmers.

2. Agriculture Pest control can trap many pests such as Coccinellidae, Nephotettix nigropictus, Adult cotton leaf worm, Leaf miner fly, Rhinoceros beetle, and Brontispa longissima Gestro. They are general pests in farm around Tamilnadu but small number can be destroyed because there was only one side of wire mesh

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