Enhancing the Quality of Environment by the Eradication of the Weed - Parthenium

By

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Introduction

I. INTRODUCTION

From Him, originate the vital force as well as the mind, all the senses, space, air, fire, water and earth that supports everything.

Upanished

Earth is unique among the planets of the solar system,, because of its water, free oxygen and life. The whole pyramid of life is supported by a complex set of interactions and exchanges between water, air, rock and life (Ghosh 1988), Earth, water, energy, air and space constitute the universe and provide the life support for man and animal and the base of all forms of vegetation and all form of human activity (Rig Veda).

The environment is inhabited by a number of different plants and animals, each of which in turn modifies the climate, the hydrological and nutritional aspects of the environment. These inter acting plants, animals and environment make up the ecosystem. As stated by Khoshoo (1988) environment is the most essential pre-requisite of human life. Deep relationship exists between the environment and human life.

Environment does have an objective impact on the quality of life at several levels. Man is the only animal that can adapt his environment to his needs. Today humankind dominates nature,

shapes the environment to suit itself as opined by Khoshoo (1988). Srivastava (1989) states that, all natural eco-systems were balanced and unaffected by man until the dawn of civilisation. But the speed and nature of man induced environmental changes have brought an increasing disharmony between him and the nature at present. Hence the purity and balance of environment is essential.

The human environment is considered as comprising those external, physical, chemical, biological and social influences, that have a significant and detectable effect on the health and well being of the individual or of communities of people. Home is the eternal abode of life and one of the many factors which determine the quality of life. Now a days environmental conditions of home are characterised by water supplies that are inadequate in both quality and quantity, poor and non existent waste disposal systems, abundant insect and animal reservoirs, vectors of disease agents and poisonous plants and weeds. Health in individuals can be promoted only through a sound home environment. Health is not just the absence of disease but also the ability to enjoy life which is facilitated by an hygienic environment. A favourable environment without accumulated garbage, hazardous plants, foul smell and stagnant water is a must, not only from the physical and physiological aspects but also from the asthetic points of view.

Among the above mentioned factors some plants and weeds like Poison ivy, Calotropis, parthenium hysterophorus and Datura,

prove to be menance to human as well as to animals for their toxicity. Forsyth (1978) says that a poison plant is a plant which gives rise to serious departure from normal health when a small quatity of its fruit, root or vegetation is eaten or contacted by a creature which is susceptible to its effects.

Even though plants were man's first food and for long remained the most important. Man's dependence on plants for the essentials of his existence has been of paramount importance in his life since the human race begun. Dorfler and Roselt 1984, Pandey 1984, Paul 1987 and Singh and Khan 1989).

Moddy (1988) and Reddy and Garg (1989) are of the opinion that apart from this, there exist plants that pose threat to the crop and the health of the people. Certain weed species growing around the houses are nuisance as they eat away plant nutrients in addition to competing vigorously with the crop for height and water and thereby reducing their productivity and menancing to the health causing allergic disorders.

One such plant is the weed parthenium- 'Parthenium hysterophorus' locally known as 'congress grass', 'carrot grass' and 'chatak chandani' a member of compositae family is native of tropical America, probably in the Carribean area, believed to have been introduced into India through PL 480 food grain imports as pointed

out by Gidwani (1975). The plant is common through out India, infesting approximately an area of 2.5 million hectares.

As mentioned by Etherington (1976), Parthenium as terrestial plant, rooted on one spot and originating from seeds which may be distributed at random, is at risk to a whole range of environmental hazards which a mobile organism can escape.

Parthenium is a great health hazard. It is noxious on two accounts, firstly as a weed in both arable and non-arable lands and secondly, as a health hazard causing allergic diseases, notably dermatitis, fever and asthma. Men are more prone to it than women. Children below the age of puberty are not affected. Not only the human beings exposed to these ailments but also the cattle passing through the dense stands of this species suffer from many maladies. Another grave hazard is the possibility of milch cattle grazing on the plant passing the toxic principle into the milk as claimed by Singh and Singh (1987).

The aim should be to prevent the plant from getting into new areas and gradually the methods of destruction of parthenium would be developed and popularized to be free from this menancing weed (Singh and Singh 1987, and Tiwari and Bisen 1984).

The environment of Coimbatore city is polluted with the mushroom growth of parthenium, specially during the rainy season,

it grows enormously on the road sides, pathways, near and around the houses and on any vacant land. Few people take measures to destroy it as majority of them are ignorant about the extent of its hazardous nature.

This problem can be tackled only through creating awareness among the people regarding the hazards of the poisonous plant and by educating them about simple effective methods to eradicate parthenium.

The investigator was interested to study about the methods of eradicating the dangerous weed. Hence the investigator has taken up this study with the following objectives:

1. To find out the environmental awareness of the homemakers.

2. To find out the awareness of 'parthenium' as a menance to health.

3. To find out the measures adopted by the homemaker to destroy the weed.

4. To find out the effective method of destroying parthenium weed through experiments.

5. To educate the homemakers regarding the parthenium destruction and suggest the best measure to eradicate the weed.

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Review of Literature

II. REVIEW OF LITERATURE

The literature pertaining to the study on "Enhancing the and quality of Environment by Eradication of the weed Parthenium", is reviewed under the following headings:

A. Earth and its Constituents.

B. Importance of Ecosystem for Human Existence.

c. Degradation of Ecosystem.

D. Parthenium as a Menance to Health.

E. Eradication of Parthenium.

F. Educating the People.

A. Earth and its Constituents:

In the middle of the 20th century, we saw our planet from space for the first time. Earth is not the centre of the universe. From space we see a small and fragile ball dominated not by human activity and edifice but a pattern of clouds, Ocean, greenery and soils (The world commission on Environment and Development 1987).

Basu (1988) states that, the earth's atmosphere is a tenuous envelope of a mixture of gases that not only sustains all life on this planet but also plays a vital protective role.

Basu (1986) opines that the biosphere is the delicate layer of soil, water and air upon the surface of the earth within which all life exists and of which it forms a part. The nature of the air, water and soil in the biosphere is constantly being changed through their inter-action with the living things, and living things are in turn dependent upon the physical environment which they help create and maintain.

Life is inextricable from its environment, life is only possible in a nuturing milieu, it cannot survive in empty space. Life is dependent on the environment. This does not mean that the environment determine the multifarious forms and activities of life and least of all human ways of living. On the global ecological level it is clear that some type of balance must be maintained between human population and available resources, (Hammond et al , 1982).

Strahler and Strahler (1973) further remarks that, organism whether belonging to the plant kingdom or to the animal kingdom interact not only with the physical environment, which they occupy but with each other as well. These interactions may be in the form of exchanges of matter energy, and stimuli of various sorts between life forms and the environment. (Figure 1.)

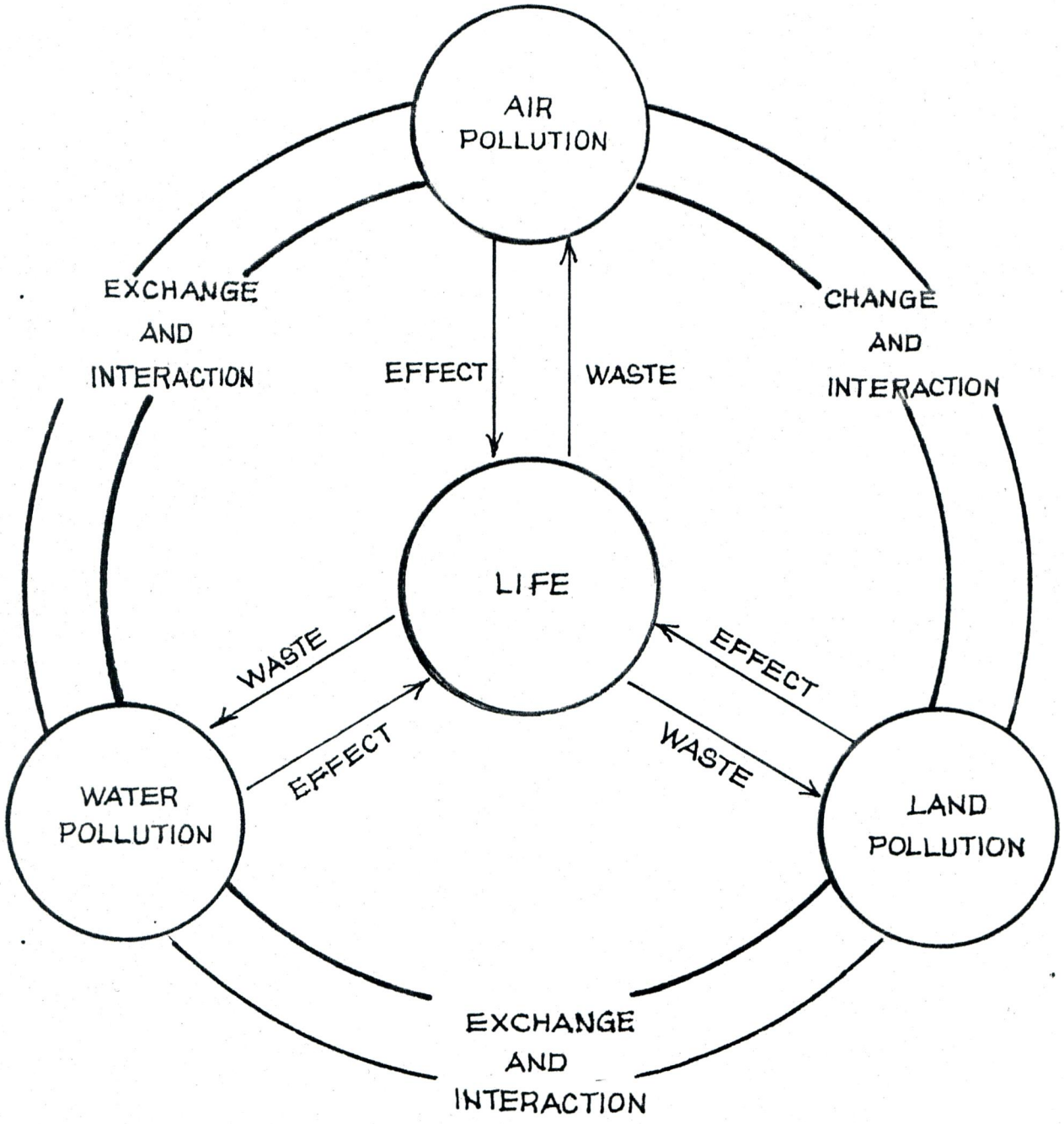


Figure 1: Pollutant Exchanges and Interactions Between Air, Water, Land and Life

Man is in constant inter-action with several environments including the biological, which is concerned with the conditions extent within the body, the physical which is concerned with the natural setting and cultural which focusses on man's manipulation of his surroundings. The environment includes all these biological, physical, social and psychological factors, which influence man and give direction to his development says Bandhu & Berberet (1977), Nathawat etal (1988) and Bajwa (1989).

The new term 'ecosystem' was proposed by Barret (1978) to define as a basic unit of study encompassing biological, physical, social, economic and cultural influences on the total system. Allaby (1983) further elaborates ecosystem as a community of inter-dependent organisms together with the environment.

Khoshoo (1988) defines environment as, the sum total of all conditions and influences that affect the development and life of organisms.

As stated by Verma (1988), environment is what institutes our existence. It includes air, water, land their inter-relationship with human beings other living creatures, plants, micro-organisms and property.

2. Importance of Ecosystem for human existence:

Sewell (1975) defines ecology as the study of inter-relationships between living organisms and their environments.

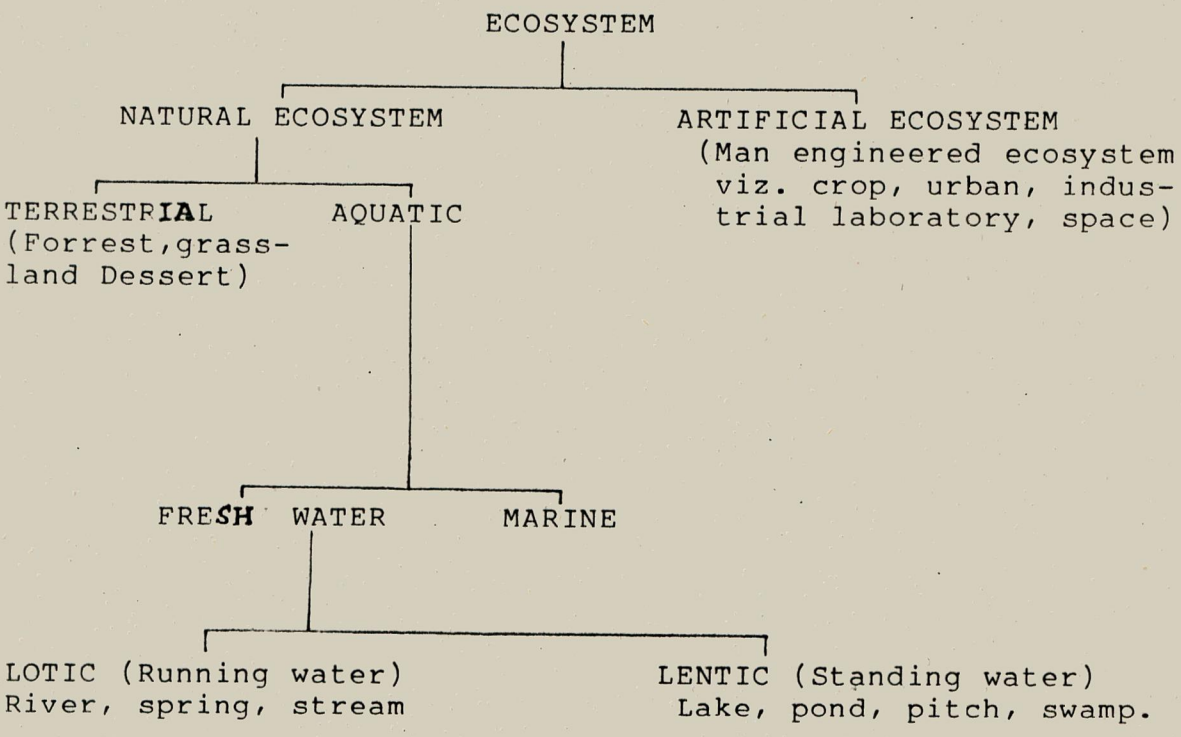
He further states that ecosystems can be divided into two broad sets of components, the biotic (living) and abiotic (non-living). Examples of biotic parts would be the water, air, mineral and various inert gases. The biotic cagetory can be sub-divided into three functional groups:

1. Producers: green plants, algae, phytoplankton

2. Consumers: all animal life including isects, mammals, fish, bird and man, ultimately depend upon consumption of producers to sustain life.

3. Decomposers: essential in almost any ecosystem are the decomposer organisms, the fungi, and the bacteria that break down complex compounds from waste materials-including dead produces and consumers to make chemical components again available to producers.

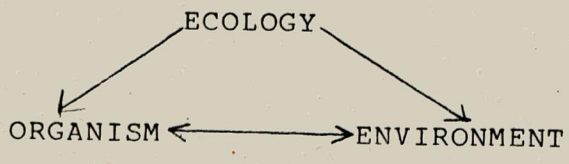
The concept of an ecosystem is essential for two reasons. First, many kinds of organisms modify the physical environment and affect each other through that modification. Second, global geochemical cycles, which are essential parts of machinery that support life on earth, are strongly influenced by the rates of flow of nutrients and energy through local ecosystems.



CLASSIFICATION GIVEN BY AGARWAL, 1987)

Krishnan (1983) exhorts that a close relationship exists between the living organisms and the environment

in which they live. The living organisms depend on their environment for food, respiration and shelter. At the same time they release the nitrogeneous waste materials like carbon dioxide, and water into the environment. Hence no organisms can keep aloof from its environment and any change in the environment affects the organisms either directly or indirectly.



(Relationship between the organisms and their environment)

As stated by Srimal (1988), without fresh air of good quality there cannot be a healthy life.

The use of land is down to earth index of a civilisation, for land has been silent partner is the rise and fall of civilisations, the soil forms the main feeding zone for plants and on which all life ultimately depends as claimed by Bandyopadhyay etal(1987).

The plants and animal communities of a region constitute a biome. The living organisms interact with non-living environment and exchange of material occur

between them. A unit of biome interacting with its environment constitutes as ecosystem, say Mehra and Khanna (1982).

As further reviewed by Mehra and Khanna (1982), the vegetation of a place may be forest, grassland of desert, has three important roles to play, firstly it affects the environment by decreasing solar radiation, and temperature, increasing humidity by transpiration, changing soil by addition of organic matter which is converted into humus. The environment inturn controls the growth of organisms. Secondly it allows the cyclic flow of energy. Sun is the ultimate source of energy. This solar energy cannot be directly used by human beings or animals except for a little warming up. They derive energy from the food being provided directly or indirectly by plants. Plants trap this energy and convert it into chemical energy by the process of photosynthesis. Thirdly the soil is the source through which we get mineral elements required for sysnthesis of important biochemical life giving compounds. It is plants only which can absorb these elements from soil and convert them into complex compounds (Bandhu and Berbett, 1987).

Verma (1984) adds that the importance of plants to the living world hardly needs any elaboration. There are plants over which the whole animal kingdom is

dependent on for food. Man's basic necessities of food, shelter and clothing have been met with by plants from times immemorial. The whole existence of human race is dependent on these plants, the requirements of carbohydrates, proteins, fats and oils, minerals and vitamins by the human body are met by these plants. At the same time there are plants which contain alkaloids, Cocain, opium, Hashish, peyote, cappi etc. are examples of very strong narcotics, they have hyphotic and halucinating effect on the mind of the user. This results in great physical and mental degradation, senselessness, coma, convulsion and absurdity (Hill 1975 and Pandey 1984).

3. DEGRADATION OF ECO-SYSTEM:

When the universe was sparesely populated and human being were close to nature, living ought to have gone smoothly. Man accepted whatever was offered by nature and in turn he came to worship nature itself,. be it light, water, air, mother earth, anything that allowed him to live and die peacefully, says Srivastava (1986).

Time changed, population increased and with it man's need. He had to defy nature, combact it. He denuded forests; which gave way to residential

accomodation or to agricultural forms or to industrial units claims Rajvanshi and Bhargava (1985).

There is a measure in all natural things-in their speed, size or even violence which makes all natural systems of which man is a part, tending to be self balancing, self adjusting and self cleansing, state Sahu (1986).

In the process, human race has changed from simple minded fruit and root gatherer, the hunter and the grower of food who worshipped nature, to a callous, self centred destroyer of nature, as much as that today development has in a sense become synonymous with deforestation and desertification and progress with pollution, as acclaimed by Khoshoo (1988).

Mukherjee (1986), remarks that the considerable waste generated by the human species caused environmental degradation and this throws the life support system out of gear.

Ghosh (1987) opinies that the social and economic development has resulted in unregulated growth and the creation of vast urban and industrial complexes, they pollute the atmosphere and affect the health of the people.

Sen (1970) feels that, the environmental pollution can be attributed to several factors like urbanisation, industrialisation, automation, unsound planning and lack of general awareness in the masses.

Paul (1987), Diwan (1987) and Bajwa (1989), state that all over the world, the exponential growth of people, production, power, place and pollutants are having their impact on water air and land cycle to nature to the detriment of mankind (Figure 2).

Sharma (1988) indicates that, environmental problems are now becoming global in nature and subtle linkages are now being discovered. Deforestation in Nepal is linked to floods in India, emissions from U.K. are causing acid rain in Scandinavian countries, consumption of hamburger in the U.S are linked to forest depletion in Latin America since most of the forest area is cleared for raising piggery. While such inter-national environmental problems have been identified, the chernobyl nuclear leakout. It might amount to interference in soverignity of the U.S.S.R but the disaster had spread radiations in entire Europe.

All man's activities disturb the eco-balance by deteriorating the environmental conditions. (Figure 3).

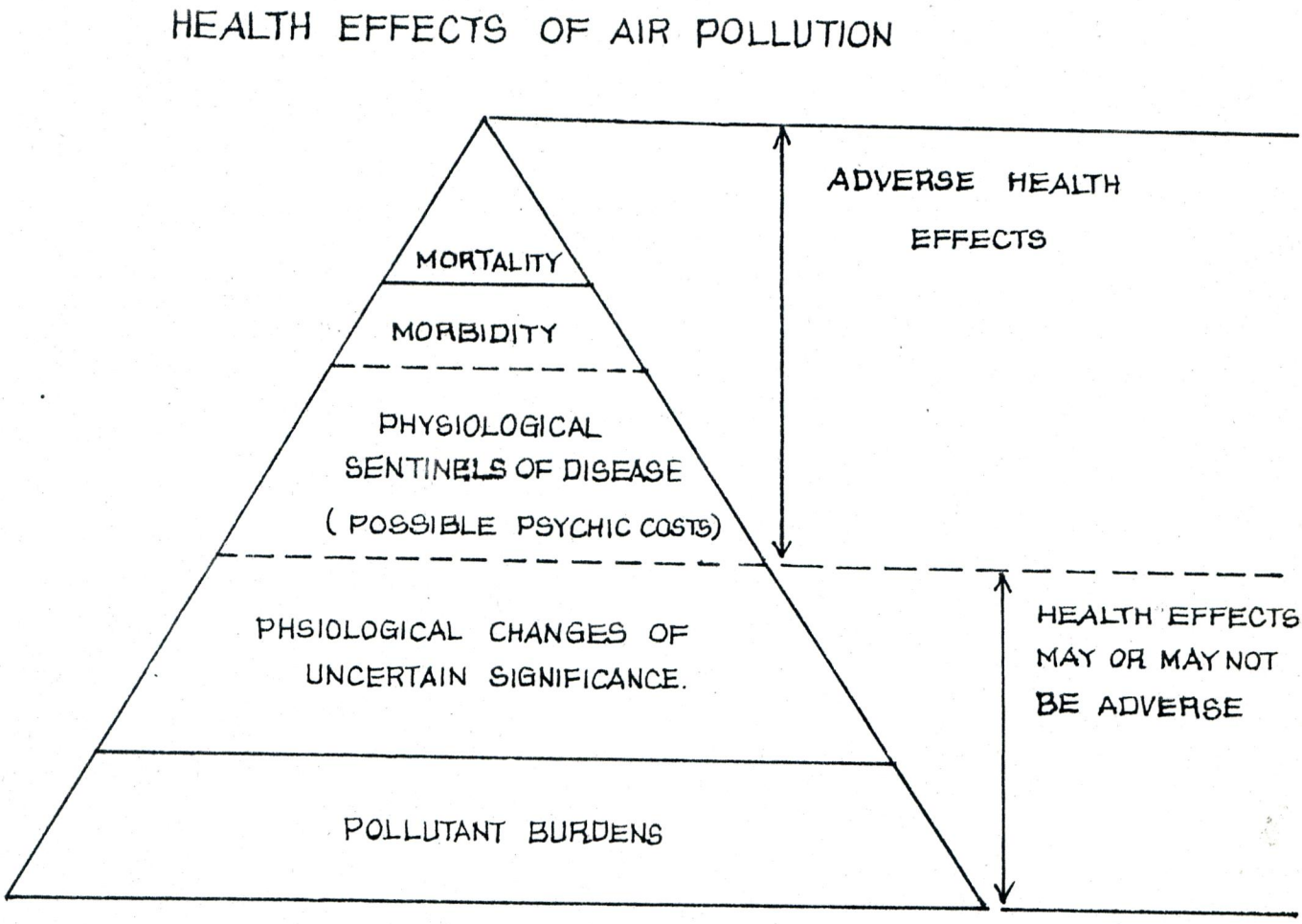


Figure 2: PROPORTION OF POPULATION AFFECTED

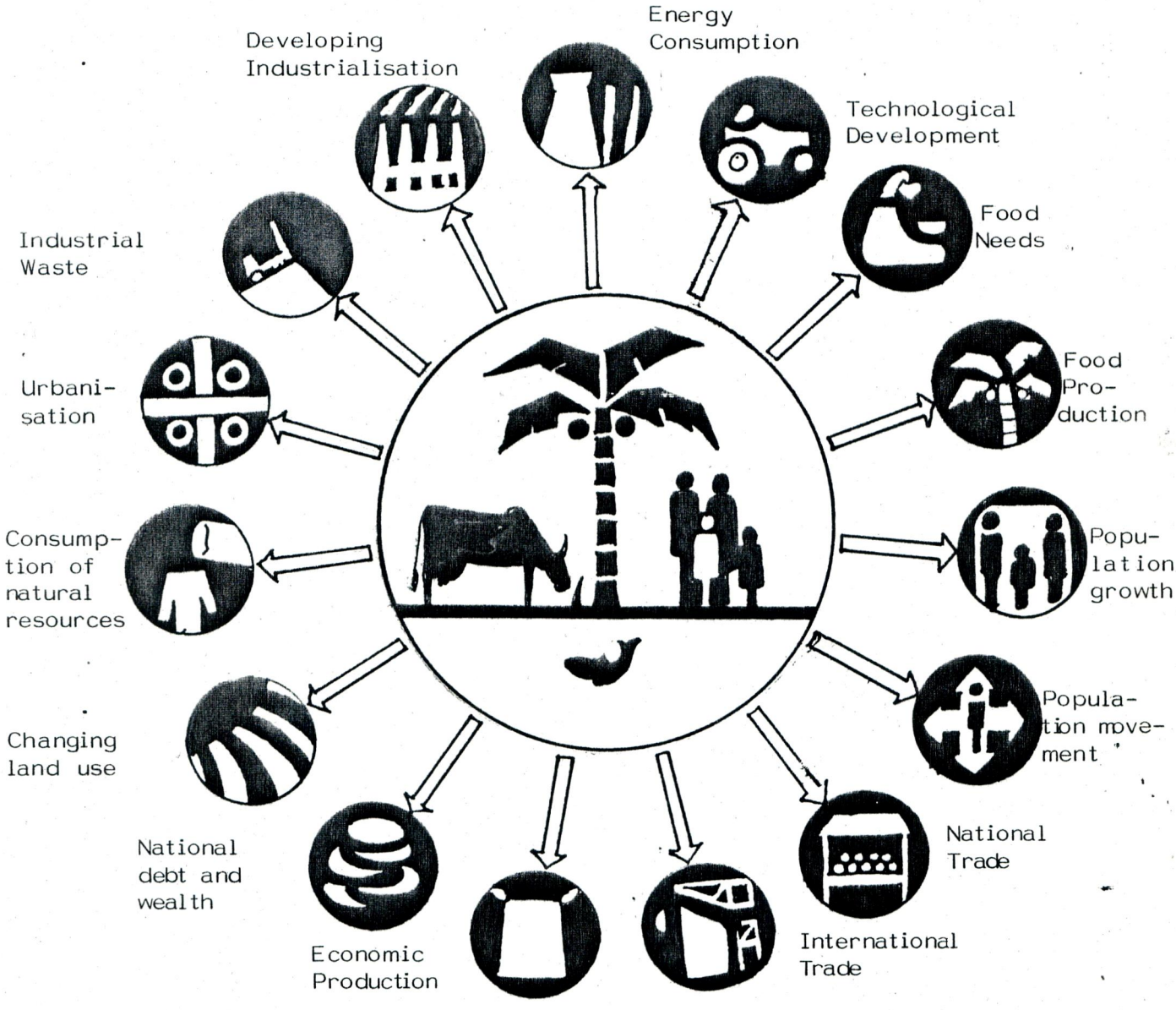


Figure 3: Source: The State of Environment 1984. The environment in the dialogue between and among developed and developing countries. United Nations Environmont Programme.

Any undesirable change in the physical, chemical or biological characteristtics of air, water and soil, that may create a hazard or potential hazard to the health, safety or welfare of any living species is called pollution as defined by Agarwal (1987). The sustances which cause pollution are known as pollutants.

The various principle pollutants as given by Sen (1970) Agarwala (1987) and Puri (1989)are

i. Gaseous Pollutants: Oxides of Nitrogen particularly Nitric oxide, Nitrogen dioxide, sulphurdioxide, carbon monoxide, hydrogen sulphate, chloride and Iodide.

ii. Flouride Compounds:

iii. Metal, Mercury, lead, Iron zinc, Nickel and cadmium.

iv. Agricultural pollutants: Pesticides, Herbicides, fungicides and fertilizers.

v. Complex organic pollutants: Benzene, Benzpyrene, acetic and ether.

vi. Photo chemical oxidants: Ozone, Pan, elthylene and aldehyde.

vii. Deposited matter: Soot, smoke, tar, dust and grit.

viii. Solid waste:

ix. Radio active waste:

x. Noise:

Bijlani (1977) opines that, atomic and thermo nuclear explosions, both in air and underground pose another threat to human environment.

Unsound planning adds to the environmental crisis. Lack of planning has caused uneven growth of cities and towns. The haphazard expansion stand in the way of having modern municipal amenities like sewerage, proper drainage system, water supply, roads and pavements and cause an atmosphere injurious to people's health, as claimed by Puri (1989).

Jathal (1989) conducted a study with 1000 people in two villages in Hoshiarpur district with regard to the awareness, regarding specific pollutants. The findings are as follows:-

A majority of the respondents did not consider unhygienic habits of pollutants.

A very large majority held that keeping waste material near the houses is a pollutant.

A large majority of the respondents considered dust as a pollutant.

Very few of the respondents considered fertilizers and insecticides as pollutants and agricultural machinery was considered as a source of pollution by the majority.

On just about every aspect of environment the respondents belonging to higher caste groups, higher education and higher income categories were more aware. Conversely, inspite of various efforts by the government lower caste groups remain ignorant.

Nathawat, etal (1988) exclaims, that population and environment are the two sides of the same coin. There cannot be greater danger to the environment than the uncontrolled rapid growth of population.

Issar (1987) exhorts that, poverty is an environmental disaster. Under intensive demographic pressures the wilderness areas are directed to agricture and other human activities.

Nathawat, etal(1988) claims that with the increasing pleasure of population, the forests have been pushed back to the hills and even the protective

vegetative cover is removed for bringing the land under cultivation and to meet the food production demand.

D. PARTHENIUM AS A MENANCE TO HEALTH:

Parthenium hysterophorus, an exotic weed, came to India along with some of the cereal grains imported from the U.S. This weed is a native of west Indies, central and north America and has been found extensively in Argentina and Mexico, according to The Hindu (1976).

The weed has acquired many local names like, "Safed topi", "phandariphuli" and so on. Since its leaves resemble those of carrot, it is called "carrot weed". The name "congress ghas" and "carrot weed" have come to it, because infull blossom the numerous white flowers of the plant, resemble the white Khadi cap, congress men used to wear. The current (1975) and Kaur (1987).

Mahadavappa and Joshi (1987) and Singh and Singh (1987) describe the weed as an errect, perenial herb growing to about one to five feet high with a diameter of the upper ranging from 45 cm to 60 cm. Stem is whitish hairy angular, longitudinally grooved and profusely branched. Leaves resemble those of carrot, alternate,simple but pinnately and irregularly, much dissected, tips acute, margin entire with a leaf length

and breadth varying from two to eight centimetres respectively. In florescence is terminal or axillary, penducled and slightly hairy. The head consists of numerous minute florets. The flowers of the periphery are fertile. Female flowers are jug shaped male flowers are infundaibuliform with a slight constriction demarkating lower abortive ovary, stamens five, anthers with small knob-like prolonged connective, with very short filaments. The fruit is ellipsoid, brittle, dark with two appendages. This facilitates the fruit to spread easily and rapidly hrough the wind currents. The weed produces flower and fruits throughout the year (Figure 4).

Mahadevappa and Joshi (1987) proclaims that, the special quality of this weed is its adaptability. It grows any where and everywhere. It can be found in the river beds, on the roadside, farmlands, vacantplots, roof tops, parapets of walls, rocky wastelands, railway tracs cannals private compounds and public highways.

The New Delhi correspondent of 'THE HINDU' (1976) reviews literature on a study done by Dr. Mani on the habitat of the Parthenium weed. The studies have shown that its habitat lies in most areas and it flowers and fruits throughout the year. Its profilic seeding ability and the non-dormancy of the seeds are found to be responsible for its rapid spread all over the country. It was noticed that it mostly grows in uncropped waste lands.

THE NOXIOUS WEED

Figure 4: Parthenium hysterophorus

Tiwari and Bisen (1984) revealed that parthenium, can adopt to varying cropping and ecological situations. It also appears to have its own adaptive protective measures, to tide over water stress.

Krishnamurthy (1976) states that the existence of Parthenium in the country was first noticed by scientists in 1956 in the experimental farm of the agricultural college near Pune. The plant propagates through seeds and the seeds attached to a pair of wings (pappus) are widely dispersed by the wind and single plant is capable of producing more than ten thousand seeds.

Peng etal (1988) reports the unwelcome occurence of the weed in Taiwan.

Krishnamurthy (1976) review the study of S.D. Kanchan that reports, that parthenium contains parthenin (0.33 of dry plant weight) a sesquiterenic lactane the active chemical, which is attributed to cause dermatitis. He further quotes the study of Dr.G.R. Kelkar(1970), who on examination of parthenium observed that though it possessed certain activity as a depressent to the central nervous system, it was too toxic to warant further investigation. Peng etal(1988) describes the plant as the source of nasobronchial allergy.

Gidwani (1975) states the observations of Dr.Lonkar on the health hazards caused due to parthenium. The pollen grains of the weed float freely in the air causing allergic deseases like dermatitis, fever and asthma. A typical patient is an adult male. Young women and children are rarely affected.

The symptoms are as follows:-

Initial symptoms is ITCHING. It starts around the eyelids, face, sides of neck, then spreads to the eyelids and knees. Initially there is a faint redness, swelling and blisters.

As the disease spreads to sub-acute and finally to chronic stages, thickening and excessive darkness sets in. Itching is very intense. As the disease progresses, the other areas like chest, forearms get involved. At times it ends up in generalized eczema. The infected parts specially face, neck and arms are covered with hard crocodile like skin with cracks and sores.

Parthenium which is prevalent from Kuluvalley to Kerala, occupies almost all fallow fields of our country, thereby demanding the grazing grounds for our livestock. Apart from this it has of late crept into agricultural and horticultural crops, making the blotting out operation a burden-some business. It simply pounces on the people engaged in the elimination work causing them allergy (Krishnamurthy 1976).

As reviewed by Gidwani (1975) in the words of Pawar, Parthenium not only sucks everything from the land but there are complaint from farmers that it harbours rabbits and snakes which also damage the crop.

Gidwani (1975) further claims that once it infests a plot, this aggressive weed destroys all other crops. It is fast invading sugarcane, cotton, wheat and other crop lands. It is covering many vegetable growing area and orchards once established it is hard to control by normal or mechanical means as an innumerable numbers of seeds have already gone into the soil. The "congress grass" also tremendously reduces the output of grazing lands. Soon meat and milk will also become scarce.

It drastic measures are not taken immediately, experts predict that there will be no land left for crops, no fodder for cattle and a large population will be suffering from deadly eczema (Kaur 1987).

It has been estimated that it would cost Rs.250 to Rs.300 per acre for removal of the weed once. Further about 16 per cent of the labourers deployed for pulling out the weed may get dermatitis (New Delhi correspondent, 'THE HINDU' 1976).

Hence the need for control of this perincious weed.

E. ERADICATION OF PARTHENIUM

The control measures can be divided into PREVENTIVE and CURATIVE measures, as given by singh and Sing (1987).

1. Preventive measures

In this method the aim is to prevent the plant from getting into new areas. As the plant is an annual and produces enormous amout of seeds a wise step would be to keep a vigilant eye on the occurence of this plant species in any locality and as soon as it is sighted, to removes it.

2. CURATIVE MEASURES

a. Biological Control

The biological control technique has long been recognised for weed control according to Krishnamurthy (1976).

i. Beetle

An exotic beetle zygogramime bicolorata from Mexico, has been imported to rid the country from the ecological menance of parthenium.

The leaf feeding beetle is the first of the three

insects, to be introduced in the country for controlling the wild growth of parthenium with assistance from the Common Wealth Institute of Biological Control (CIBC), Trinidad. It was initiated by ICAR in 1977, but it was not until 1980 that the first field trails started.

The other two beetles imported are

Smicronyx rutulentus, which feeds on the seeds of Parthenium and the other is a stemboring beetle epiblema stremiana.

Tests at the CIBC station in Bangalore have proved that these imported insects are plant specific, and do not prey on any other plant (INDIAN EXPRESS 1989).

ii Cassia Sericea

Cassia sericea is a fast developing weed and is of the same origin as Parthenium hysterophorus. The poison weed parthenium hysterophorus was successfully destroyed with the help of cassia-sericea. This process of eradicationn was first developed by Dr. M.Mahadevappa and Dr. Shyama Sundar Joshi, as reported by The Telegraph(5th May 1985).

Jayakumar etal (1988) conducted studies on the allelopathic effect of Cassia sericea on the growth of Parthenium hysterophorus and its effects are shown in Table.1

TABLE - I

ALLELOPA-THIC EFFECT OF Cassia sercea ON THE GROWTH

Parthenium hysterophorus/m^2

S.No.	Effect	Days after sowing Cassia sericea				
		15	30	60	90	120
1.	Cassia sericea Plot	30	65	21	26	6
2.	Control Plot	38	73	32	64	89
3.	% reduction over control	78.95	89.04	65.63	40.63	6.74

b. Chemical control

Singh and Singh (1987), Suryawanshi (1990) and Brar and Walia (1990) present certain chemicals that are tested to control the parthenium grass. Following important chemicals have found to be effective in controlling its menance.

(i) 2, 4-D Sodium Salt: This chemical is easily available. The spraying of 2 Kg. 2,4-D sodium salt per hectre in 500 litres of water provides effective control.

(ii) 2, 4-D Amine Salt: It is available in the liquid form the spraying of 1 Kg. 2,4-D amine salt per hectre in 300 liters of H20 is sufficient to cent-percent control of parthenium species.

iii Gramaxone: It is mostly recommended for non cultivated field e.g. rail and road sides, and pasture lands. In such type of places spraying of 0.5 Kg. diquat ai/hectre in 400 litres of water is more effective to control partheniune. If 2 Kg. Na salt of 2, 4-D are mixed with gramaxone then it becomes mor effect ive. Flowering time is good for spraying the chemical.

Sarkar (1990) reports of experiments conducted on the control of Parthenium hysterophorus to study the effects of 2,4D and sodium chloride alone and in combinations. The sodium chloride was sprayed in 10, 20 and 30 percent solution, the highest grain yield was recorded in plots treated with 10 percent sodium chloride spray.

Methodology

III. METHODOLOGY

The study on "**Enhancing the Quality of Environment by Eradication of the Weed - Parthenium**" included three aspects such as

A. Household Survey - To know the awareness of selected urban homemakers on environmental degradation

B. Experimental Study - to find out an appropriate method of eradicating the weed - Parthenium

C. Extension of knowledge on methods of eradication of the weed.

A. Household Survey:

The survey conductedd comprised the following steps:

1. Selection of area
2. Selection of sample
3. Selection of method
4. Formulating and finalising the tool
5. Conducting the survey
6. Processing of the data

1. Selection of area:

In Coimbatore city, the poisonous weed parthenium has spread its tentacles in every area possible. The investigator selected the easily approachable areas such

as Ramalingam Colony, Peelamedu, and Gandhipuram where the weed growth was found in abundance.

2. Selection of sample:

Seventy five homemakers residing in Coimbatore city were selected by using judgment sampling, as by judgement the most important elements can be certainly included in the sample.

3. Selection of method:

Interview is an act of verbal communication for the purpose of eliciting information and this method gives scope to get wide range of views on the essentials (Black and Champion, 1976). Personal interview procedures are probably the most effective ways of enlisting co-operation from the most populations (Fowler, 1984). Owing to several advantages interview method was selected to collect information regarding the environmental awareness.

4. Formulating and finalising the tool:

As an instrument of science, the schedule as a tool has great potentialities when it is properly used in an interview. According to Sukhia et al (1976), a schedule is the name usually applied to a set of questions which are asked and filled in by the interviewer in a face

to face situation with another person. A schedule has greater advantages since it provides opportunity to establish rapport, to explain the purpose and to make the necessity of items clear. It also economises time and expense and provide complete and usable returns while conducting the survey.

A schedule was therefore prepared which called for general informaiton on family bacground, environmental condition, awareness on the deteriorating condition of the environment, knowledge about the weed-parthenium, and the method adopted by homemakers to eradicate the weed.

Before the final form of the schedule is adopted it is desirable to carry-out a preliminary study on a sample basis. By this pilot study, the investigator can find out the drawbacks in the schedule and the extent of non-response likely to take place (Gupta, 1987). Hence a pilot study was conducted to find out the appropriateness of the schedule. Based on the results the schedule was modified and finalised as shown inAppendix I.

5. Conducting the survey:

To ensure co-operaiton from the respondents, rapport was first established by friendly approach during the leisure hours of the homemakers by investigator. After establishing good rapport, the purpose of the study was introduced and the information as per the schedule was gathered and recorded.

6. Processing of the data:

The data obtained were consolidated, tabulated, analysed and presented in Chapter IV.

B. **Experimental Study:**

The experimental study consisted of the following steps:

1. Selection of plots
2. Selection of treatments
3. Treating the selected plots
4. Observation of the treated plots
5. Studying the germination count.

1. Selection fo plots:

Areas having thick growth of parthenium were taken for experiments. The selected plots were within reachable distance of th investigator. The plots were selected in the campus of the Institution, near the quarters of Siruvaninagar and the campus of Avinashilingam quarters. Seven different plots with four replications of each of 25 sq.mts. size were selected for different treatments and one plot of the same size was selected as a control plot.

2. Selection of treatments:

The treatments should be simple, easy and convenient for the common man to use it. Hence the following treatments were selected to find out the best method of destruction of Parthenium.

a) Treatment No.1:

20 per cent sodium chloride solution; (20% NaCl).

200 g of common salt (NaCl) was mixed in 1 litre of water to obtain 20% NaCl solution. for each plot 30 litres of water and 6 kg of NaCl was used (Figure 5a and b).

b) Treatment No.2:

5 per cent soap solution (5% Soap solution).

50 g of Nirma soap was mixed in 1 litre of water. For each plot 20 litres of water and 1 kg soap was used (Figure 6a and b).

c) Treatment No.3:

A combination of 20% NaCl and 1% soap solution. The same concentraiton as 20% NaCl was used but only 10 g of soap was added to 1 litre of water. For each plot 30 litres of water 6 kg of common salt and 300 g of soap was used(Figure 7a and b).

d) Treatment No.4:

Gramaxone at 0.2% concentraiton, hence 18.3 ml of gramaxone in 5 litres of water was used for each plot (Figure 8a and b).

e) Treatment No.5:

Gramaxone at 1% concentration.

Hence 18.3 mol of gramaxone was addedin 1 litre of water was used for each plot(Figure 9a and b).

f) Treatment No.6:

A combination of gramaxone +2,4,D Na salt at 0.3% concentration. 10.3 ml of this combination was used in 5 litres of water (Figure 10a and b).

g) Treatment No.7:

A combination of gramaxone +2, 4 D Na salt at a high concentraiton of 0.6% was used. hence, to obtain this concentration 10.3 ml of gramaxone +2, 4,D Na salt was added in 1 litre of water (Figure 11a and b).

3. Treating the selected plots:

Each treatment was replicated four times. The treatments 20 per cent sodium chloride solution, 5 per cent soap solution and 20 per cent sodium chloride plus 1 per cent soap solution, were given by sprinkling the required concentration of thesolution by hand. Gramaxone and gramaxone plus 2,4 D Na salt solution of two different concentrations were sprayed with the help of hand operated sprayer.

4. Observation of the treated plots:

The plots after treatment were observed at three different stages:

Stage I	24 hrs.
Stage II	10 days
Stage III	20 days

And, the mortality rate of the plants of each replication for the particular treatment were recorded.

5. Studying the germination count:

When the plants have been completely dried the seeds were collected from the seven plots with different treatments and control plot.

Petridishes provided with filter paper were used to grow the plants. Twenty seeds of parthenium hysterophorus from each plot was placed. It was replicated three times. Watering was done regularly. The germination and seedling characters such as root and shoot lengths and wet weight of plants were recorded on the 7th day after germination.

The vigor index was worked out by multiplying the germination percentage with that of wet weight of plants.

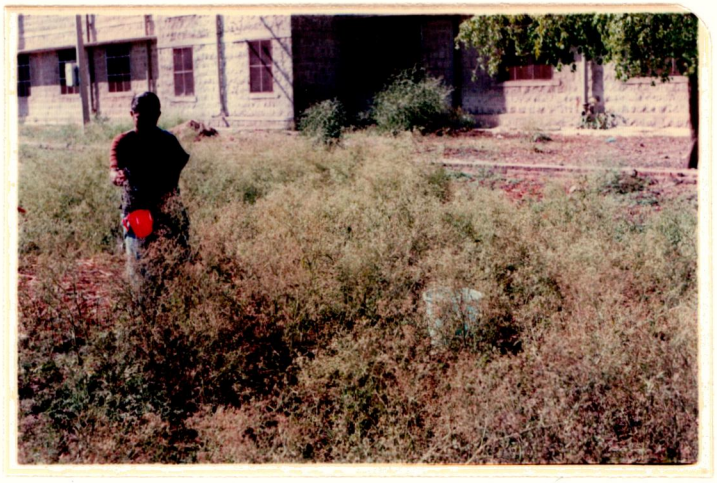
C. **Educating the People:**

According to Dahama (1984), motivation in a process of initiating a conscious and purposeful action. Motive means an urge or combination of urges to induce conscious or purposeful action. It is ordinarily a compound of feelings, appetites, inclinations and instictive impulses. it becomes objectified as an interest and unless impeded by internal or external obstacles, leads to action in pursuit of that interest. it is a goal directed and need satisfying behaviour. It influence a person to do a thing in a certain way. Hence to motivate the people to think about the eradication of parthenium, exhibition was used as a tool.

Exhibition is a means to influence people to adopt better practices by (a) arousing interest (b) stimulating thought and (c) getting action (Reddy, 1987).

With this in mind, the investigator held exhibitions in two different places to popularise the hazards of hemenancing weed parthenium and to suggest the

(a)



(b)

Figure 5a,b: 20% Nacl Solution Treatment

(a.)

(b)

Figure 5a,b: 5% Soap Solution Treatment

(a)

(b)

Figure 7a,b: 20% Nacl + 1% Soap Solution Treatment

(a)

(b)

Figure 8a,b: Gramaxone (0.2%)

(a)

(b)

Figure 9a,b: Gramaxone (0.6%)

(a)

(b)

Figure 10a,b: Gramaxone +2, 4.DNa Salt (0·6%)

(a)

(b)

Figure 11a,b: Gramaxone +2,4.DNa Salt (0·3%)

best measure of eradicating the weed parthenium in the following places.

1. Exhibition at Forest College Campus along with exhibition organised by INTACH in connection with National Environmental Awareness Campaign 1989'(Figure 12).

2. Exhibition at Avinashilingam Deemed University campus (Figure 13).

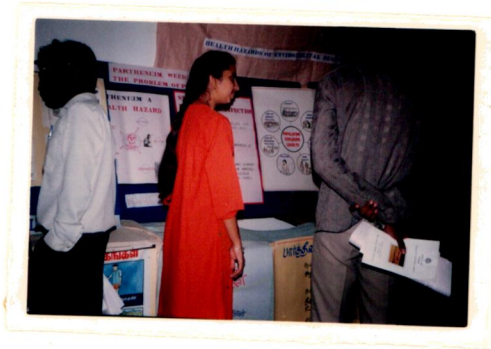


Figure 12: Exhibition at Forest College

Figure 13:**Exhibition in Avinashilingam**

Deemed University

Results and Discussion

IV. RESULTS AND DISCUSSION

The results of this study are presented and discussed under the following headings:

A. Findings of the household Survey.

B. Findings of the Experiments, on parthenium eradicaiton.

A. Findings of the Household Survey:

This aspect is discussed under the following sub-headings:

1. Background information.
2. Details about the near environment of the homemakers.
3. Environmental awareness of the home-makers.
4. The homemakers' awareness on parthenium and their eradication.
5. Suggestions of the selected homemakers to save the environment from further degradation.

1. Background information

The general details of the homemakers are discussed as follows:

a) Type of family

b) Homemakers' educational status

c) Homemaker's occupational status

d) Family monthly income.

a) Type of family:

Eighty eight per cent belonged to nuclear family and only 12 per cent belonged to joint family. This shows the changing trend towards the nuclear family system.

b) Homemaker's educational status:

The growing favourable climate in support of women's education has been marked improvement in the educational status of women (Desai and Patel, 1985). This trend is also seen in the present study as indicated in Table II.

TABLE II

HOMEMAKER'S EDUCATIONAL STATUS

S.No.	Education	Percentage of homemaker n:75
1.	Primary School	11
2.	Middle School	27
3.	Higher Secondary School	25
4.	Graduate	25
5.	Post-graduate	12

All the homemakers were literates with various levels of educaiton.

c) Homemaker's occupational status:

Seventy six per cent of the homemakers were full time homemakers, while twenty-four per cent were gainfully employed - 20 per cent as teachers and only four per cent as clerks.

This clearly supports the statement of Raj (1986), that in terms of sheer numbers women's education has grown impressively. But the attitude to the occupation of women has not progressed to suit the national ideals of equality, free and full personhood.

d) Family monthly income:

Economic status of the family depends upon the earning capacity of the family. The monthly income of the families is shown in Table III.

TABLE III

FAMILY MONTHLY INCOME

S.No.	Level of Income	Percentage of homemakers n:75
1.	Below Rs. 1,200	4
2.	Rs. 1,200 - 5,000	61
3.	Rs. 5,000 and above	35

The families were grouped based on the income level given by Housing and Urban Development Corporation (1987), as low income below Rs. 1,200, middle income from Rs. 1,200 - 1500 and high income group above Rs. 5,000/-. A majority of 61 per cent of the homemakers belonged to middle income group.

2. Details about the near environment of the selected Homemakers

The details pertaining to this aspect are discussed under the following aspects:

a) Type of house.

b) Locality and place of residence

c) Problems faced by the homemakers in their near environment.

d) The sensitivity of the homemakers to their environment.

a) Type of house:

The type of house owned by the selected families shown in Table IV.

TABLE IV

TYPE OF HOUSE

S.No.	Type of house	Percentage of families
1.	Separate Unit with own Compound Wall	81
2.	Flat or Apartment House	11
3.	Row House or Quaters	8

A majority of 81 per cent of the selected families resided in separate house, with its own compound wall. The remaining families lived in either flats or row houses. Forty-six per cent of the homemakers faced problems, as shown in Table V.

b) **Locality and place of residence:**

Sixty seven per cent of the households were in the heart of the city and 33 per cent in the out-skirts of the city.

Among the selected households, 87 per cent of the houses were in the residential area and the remaining were either near the industrial area or near railway station.

c) Problems faced by the homemakers in their near environment:

The near environment of the family is its structured and natural space and biological systems which includes, the living unit and surroundings, all the objects available in the environment and the biological systems, including plants, animals, and individual family member (Deacon and Firebough, 1977).

Only 19 per cent of the homemakers faced problems in their place of residence, as indicated in Table V.

TABLE V

PROBLEMS FACED BY HOMEMAKERS

S.No.	Problems faced	Percentage of homemakers* n: 75
1.	Dust	17
2.	Noise	13
3.	Water	5
4.	Odour	4
5.	Garbage disposal	3
6.	Fumes	3
7.	Parthenium	1

*Multiple responses

Dust and noise were major problems faced by the majority of the homemakers in their place of residence.

Of the 20 per cent employed only 15 per cent faced problems like dust, congestion and lack of proper ventilaiton.

d) The Sensitivity of the homemakers to their environment:

Seventy one per cent of the selected homemakers were aware of their sensitivity to environment.

As stated by Puri (1989), pure and healthy environment is the most essential pre-requisite of human life. This view is supported by the selected homemakers by expressing their preference of the environment, as shown in Table VI.

TABLE VI

TYPE OF ENVIRONMENT PREFERRED BY HOMEMAKERS

S.No.	Environment preferred	Percentage of homemakers n: 75
1.	Clean environment	56
2.	Noise free	26
3.	Enivornment with fresh air	8
4.	Dust free	11
5.	Without drainage problem	5

*Multiple responses.

The above table clearly indicates the type of environment preferred by the selected homemakers. Fifty six per cent expressed the need for a clean environment, others pointed out that the environment must be noise - free and dust free with fresh air and without drainage problem.

3. **Environmental awareness of the homemakers:**

The environmental awareness of the homemakers is discussed under the following headings:

a) Meaning of near environment

b) Meaning of the environment as a whole

c) Importance of pure environment

d) Environmental awareness of selected homemakers

e) Factors affecting the environment

f) Types of pollution

g) Health hazards arising from pollution

a) Meaning of near environment:

The near environment as understood by homemakers is presented in Table VII.

TABLE VII

MEANING OF NEAR ENVIRONMENT

S.No.	Near Environment	Percentage of homemakers* n : 75
1.	The area where one lives	35
2.	The surroundings of the residence	43
3.	Your relationship with the surrounding of the locality	33

*Multiple response

According to 43 per cent of the homemakers the surrounding of the residence was near environment.

b) Meaning of environment as a whole:

The meaning of the environment as a whole as defined by the homemakers is depicted in Table VIII.

TABLE VIII

MEANING OF ENVIRONMENT AS A WHOLE

S.No.	Environment as a whole	Percentage of homemakers n : 75
1.	Working-condition	11
2.	Man's total surrounding both natural and man made	52
3.	Relationship of one living thing with another	29
4.	Relationship of land, Air and water	8

The above table clearly indicates that 52 per cent of homemakers have understood that man's total surrounding both natural and man-made constitutes the environment.

c) Importance of pure environment:

All the selected homemakers considered pure environment as a must for man's existence. The reasons for this are given in Table IX.

TABLE IX

IMPORTANCE OF PURE ENVIRONMENT

S.No.	Reasons	Percentage of homemakers* n : 75
1.	Healthy living	83
2.	Happy living	12
3.	Cleanliness	7
4.	Development of area	7
5.	Clean air	3
6.	Mental peace	3
7.	Pure thoughts	1

*Multiple responses.

Eighty three per cent of the selected homemakers considered that pure environment was important for healthy living and the remaining homemakers mentioned that pure environment was important for happy living, cleanliness, to have pure thoughts, mental peace and clean air.

d) The environmental awareness of the selected homemakers:

Ninety nine per cent of the selected homemakers were aware of the deteriorating condition of the environment. The reasons for this deterioration as given by the homemakers are presented in Table X and Figure 14.

TABLE X

REASONS GIVEN BY HOMEMAKERS FOR ENVIRONMENTAL DEGRADATION

S.No.	Reasons	Percentage of homemakers n : 75
1.	Deforestation	88
2.	Poverty	79
3.	Industries	69
4.	Population explosion	67
5.	Vehicular emission	51
6.	Irresponsibilityof man	36
7.	Nuclear explosions	16
8.	Science and technology	12
9.	Thermal power station	11

The major causes for environmental degradation as mentioned by the selected homemakers were deforestation (88 per cent), poverty (79 per cent), industries (69 per cent) and population explosion (67 per cent).

e) Factors affecting the environment:

The factors affecting the environment as mentioned by the homemakers are indicated in Table XI.

TABLE X

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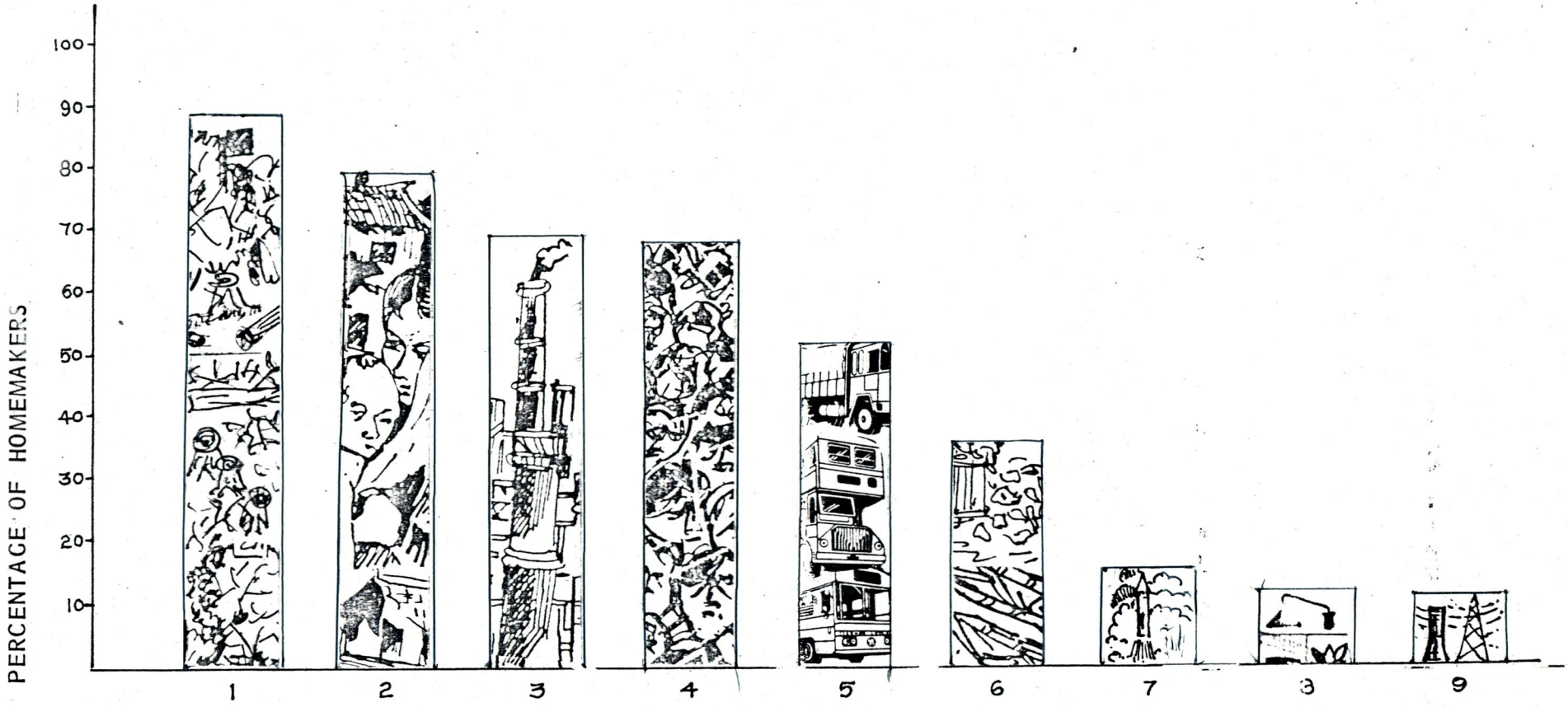


Figure 14: REASONS GIVEN BY HOMEMAKERS FOR ENVIRONMENTAL DEGRADATION

TABLE XI

FACTORS AFFECTING THE ENVIRONMENT

S.No.	Factors	Percentage of homemakers* n : 75
1.	**Industries**	
i)	Impurity of air by smoke	55
ii)	Improper disposal of waste H_2O	31
iii)	Degrade soil and water	23
iv)	Noise	13
v)	Diseases	11
vi)	Ignorance	3
2.	**Population Explosion**	
i)	Over crowding	21
ii)	Deforestation	4
iii)	Misuse of Environment	11
iv)	Poor housing and sanitation	40
v)	Poor health facility	8
vi)	Unemployment	8
vii)	Lack of resources	15
viii)	Poverty	9
ix)	Ignorance	7
x)	Lack of food	13
3.	**Science and Technology**	
i)	Over emphasis on this aspect	4
ii)	Natural calamities	4
iii)	Contamination by use of pesticides, insecticides, fertiliser	1

*Multiple response

contd....

Table XI (contd.)

S.NO.	Factors	Percentage of homemakers* n : 75
4.	**Automobiles**	
i)	Toxic smoke	39
ii)	Pollute the air	19
iii)	Water pollution	7
iv)	Noise	5
5.	**Irresponsibility of man**	
i)	Abuse the surrounding	21
ii)	Man's neglect	15
iii)	Deforestation	3
6.	**Poverty**	
i)	Does not care	29
ii)	Poor living conditions	25
iii)	Abuse the area	21
iv)	Ignorance	13
v)	Lack of Municipal care	7
vi)	Lack of economic facility	3
vii)	No family planning	1
7.	**Thermal Power Station**	
i)	Pollute water	7
ii)	Smoke	5
iii)	Pollute air	4
iv)	Heat is emitted	3
v)	Coal exhaust pollute land	1

*Multiple response

contd...

Table XI (contd.)

S.No.	Factors	Percentage of homemakers* n : 75
8.	**Nuclear Explosions**	
i)	Destruction of Earth	7
ii)	Toxic to living being	5
iii)	Pollute the atmosphere	3
9.	**Deforestation**	
i)	Untimely rain	45
ii)	Drought	20
iii)	Soil erosion	13
iv)	Floods	11
v)	Enivornmental imbalance	9
vi)	Agriculture suffer	3
vii)	Desertification	1

*Multiple responses.

The major factors contributing to the environmental degradation as mentioned by the homemakers were industries, population explosion, science and technology, automobiles, irresponsibility of man, poverty, thermal power station, nuclear explosions and deforestation.

f) Types of pollution:

The impact of pollution is so alarming that according to WHO's estimates as much as 80 per cent of the world's diseases are traceable to water pollution (Calvin, 1989).

As evinced from the study, water is adjudged as the most polluted among the three general types of pollution(Water 41 per cent, air 35 per cent and Land 24 per cent).

g) Health hazards arising from pollution:

Table XII and Figure 15 depicts the health hazards of different pollutions as indicated by the homemakers.

TABLE XII

HEALTH HAZARDS ARISING FROM POLLUTION

S.No.	Land	Percentage* n:7	Water	Percentage* n : 75	Air	Percentage* n : 75
1.	Cholera	5	Dysentry	4	Lung disease	13
2.	Diarrohea	3	Cholera	15	Any kind of disease	13
3.	Any kind of disease	25	Diarrhoea	7	Dysentry	1
4.	Dysentry	5	Any kind of disease	51	Cholera	1
5.	Typhoid	4	Typhoid	7	Cancer	3
6.	Death	3	Cardiac disease	1	Eye irritation	3
7.			Lung disease	1	Dangerous	3
8.			Death	3		

*Multiple responses.

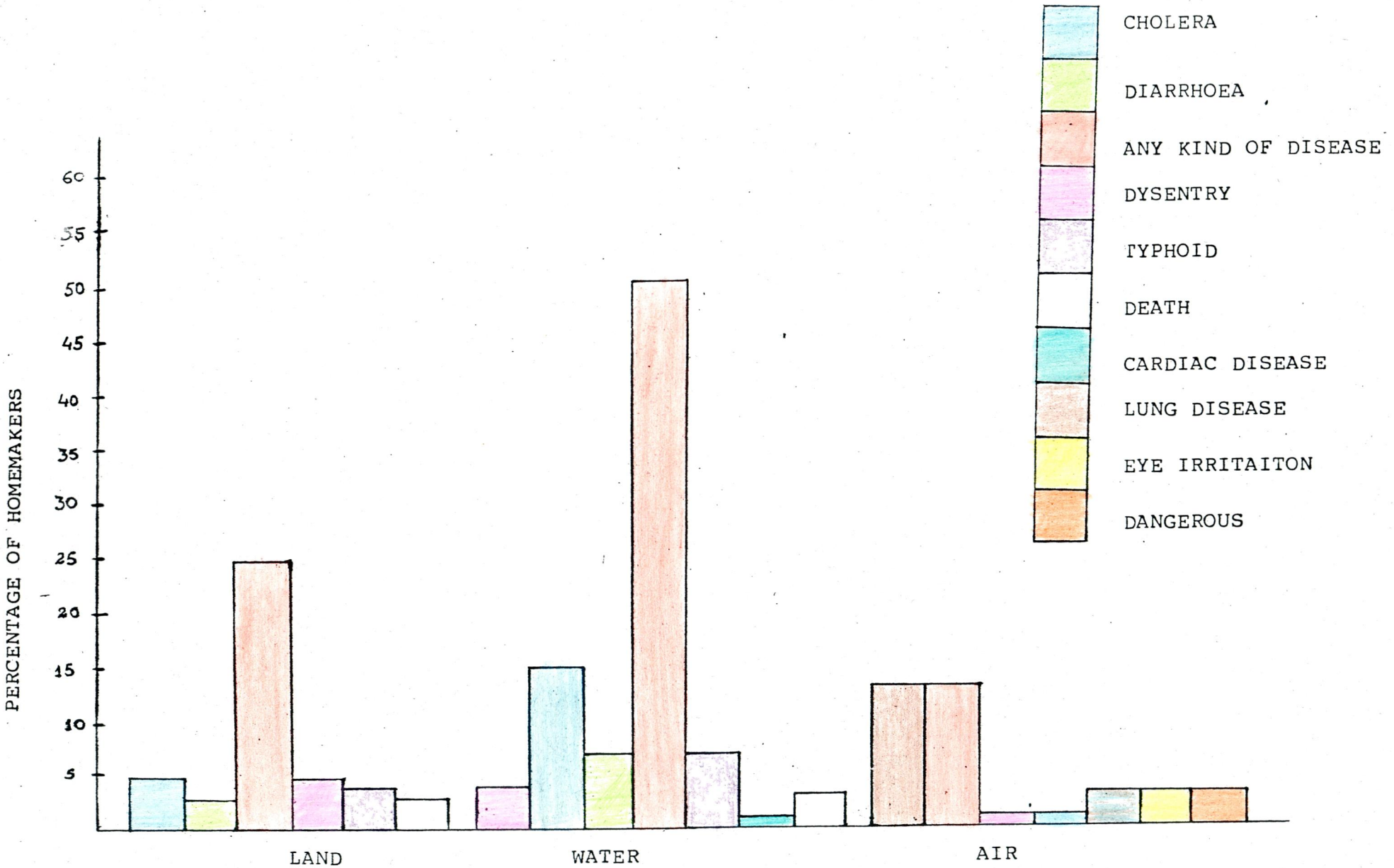


FIGURE 13 : HEALTH HAZARDS ARISING FROM POLLUTION

From the above Table, it is clear that the common health problems caused by different pollutions were cholera, diarrhoea and dysentry.

Pollution does not respect political boundaries. Economic activity conducted within the territory of one country can damage the environment of other countries or degrade international common property resources (Pearson, 1978). Only thirty per cent of the homemakers were aware of the transnational pollution. The world wide problem of the environment as mentioned by the homemakers were acid rain, greenhouse effect, change in climate and ozone layer formation.

4. **The homemakers' awareness on Parthenium as a poisonous weed and their eradication measures:**

The above aspect of the study is discussed under the following headings:

a) Awareness of the poisonous weeds

b) Parthenium as a menance to health

c) Measures taken by the homemakers to eradicate

d) Effect of parthenium on selected families

e) Suggested methods for parthenium eradication.

TABLE XIII

HEALTH HAZARDS OF PARTHENIUM

S.NO.	Hazards	Percentage of homemakers* n : 75
1.	Allergy	43
2.	Skin irritation	28
3.	Poison	23
4.	Asthma	15
5.	Cold	12
6.	Respiratory infection	4

*Multiple response

The above Table indicates that 43 per cent of the homemakers considered allergy as the major health hazard of this weed, whereas 28 per cent mentioned that skin irritation was due to Parthenium, 15 per cent of the homemakers were of the view that parthenium was responsible for asthma.

Eventhough Parthenium is a poisonous weed it has some utility value as mentioned by 7 per cent of the homemakers. They indicated that it could be used for paper making and for production of bio-gas, and green manure.

c) Measures taken by the homemakers to eradicate Parthenium:

The measures taken by 52per cent of the homemakers to eradicate parthenium are shown in the Table XIV.

TABLE XIV

MEASURES TAKEN BY HOMEMAKERS TO ERADICATE PARTHENIUM

S.No.	Measures	Percentage of homemakers* n : 75
1.	Root out	46
2.	Cutting and burning	43
3.	Sprinkling salt solution	5
4.	Cutting	5
5.	Salt and soap solution	5

*Multiple Response

While 46 per cent of the homemakers uprooted the plant, 43 per cent cut and bunrt the same. The other measures adopted were sprinkling salt and soap solution and cutting the plant at ground level. Others had not taken any steps to destroy the plant because of their ignorance about the poisonous nature of the plant since they were also not affected by the plant.

Only 50 per cent of the homemakers reported that measures taken were effective. They never compared various methods to know about their effectiveness.

Those who had taken steps to eradicate parthenium had got information from neighbours,magazines and newspapers.

d) Effect of families on selected families:

Only 19 per cent of the homemakers reported that their family members had allergic symptoms such as itching, rashes, sneezing, cold nd Asthma. Sixteen per cent attributed parthenium as the cause for the allergic symptoms.

e) Suggested methods for parthenium eradicaiton:

Only 48 per cent were deinite that it could be possible to completely eradicate this perinicious weed. The methods for eradication of Parthenium as suggested by the homemakers are givenn in Table XV.

TABLE XV

SUGGESTED METHODS FOR PARTHENIUM ERADIACITON

S.No.	Sugested measures	Percentage of homemakers n : 75
1.	Role of Government	18
2.	Spraying chemicals	18
3.	Mass Action by Public	17
4.	Rooting out	18
5.	Create Awareness among people	5
6.	Spraying of Salt solution	4
7.	Role of Voluntary Agency	4

The best method of Parthenium eradicaiton as suggested by the majority of the homemakers were up rooting and burning (18 per cent), using chemicals (18 per cent) and mass action by the public (17 per cent).

5. **Suggestions to preserve environment:**

Table XVI and Figure 16 presents the suggestion to preserve environment as stated by the homemakers.

TABLE XVI

SUGGESTIONS TO PRESERVE ENVIRONMENT

S.No.	Suggestions	Percentage of homemakers* n : 75
1.	Keep the surrounding clean	53
2.	Prevent further degradation	29
3.	Motivate others	27
4.	Proper waste disposal	8
5.	Avoid deforestation	7
6.	Understand the meaning of Balanced environment	7
7.	Plant trees	5
8.	Avoid wars	1

*Multiple response

It is clear that keeping the near surroundings clean by each family might be the best method of preserving the environment as stated by the majority of the homemakers.

B. **Findings of the Experiments on the Eradication of Parthenium:**

The results of the experiments conducted on Parthenium eradicaiton are presented and discussed under the following sub-headings:

1. Effect of treatments on the mortality percentage of Parthenium
2. Germination percentage of seeds collected from the treated plants.
3. Comparison of root and shoot lengths of the germinated seedlings.
4. Wet weigh tof the seedlings.
5. Vigor index.

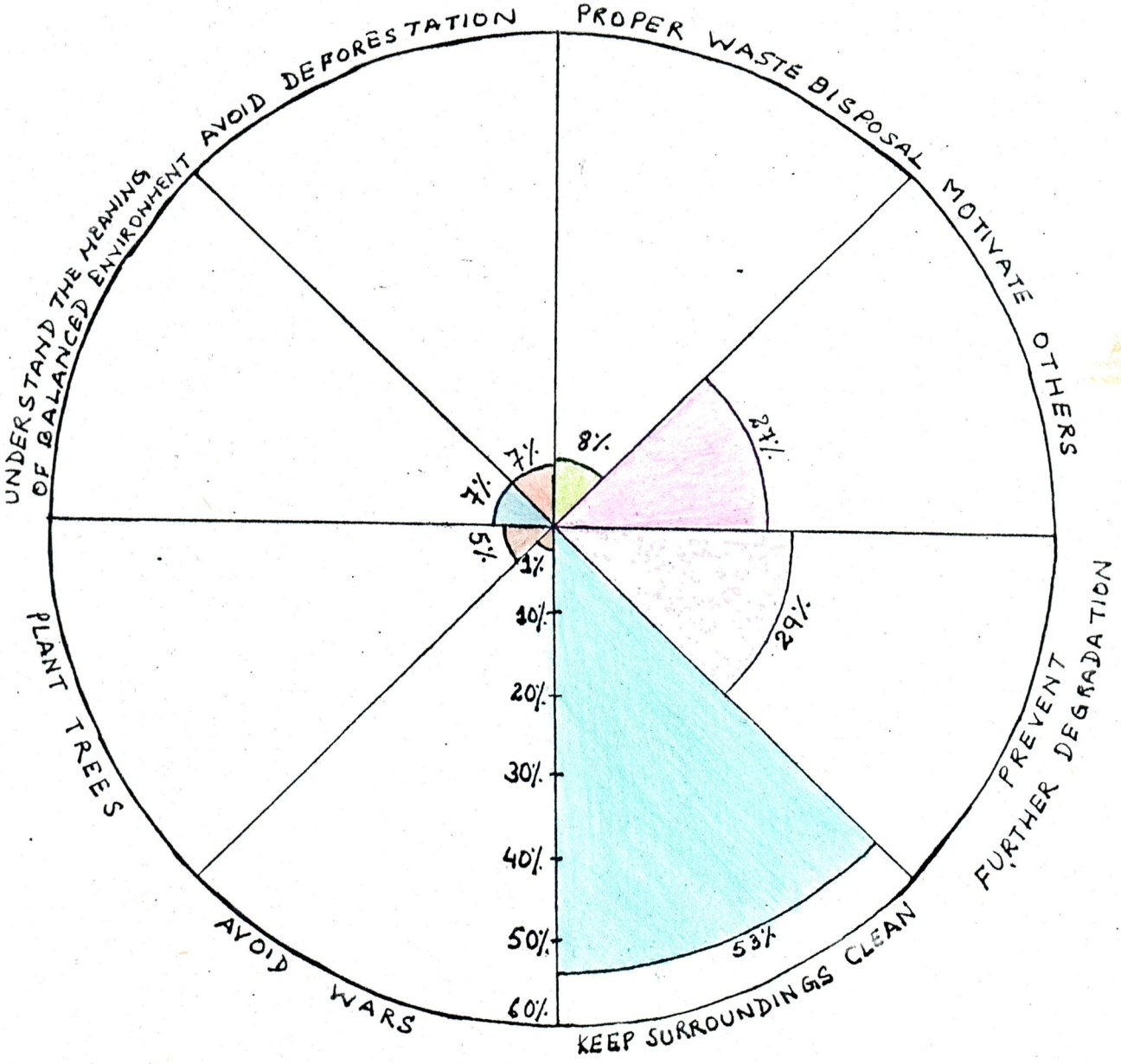


Figure 16: SUGGESTION TO PRESERVE ENVIRONMENT

1. **Effect of treatments on the mortality percentage of parthenium**

a)(i) Effects of treatments on the mortality percentage of the fully dried plants

The effect of the treatments on mortality percentage at different stages are presented in Appendix II and Figure (17-23). The data on mortality rates were subjected to statistical analysis by Factorial randomised block design.

TABLE XVII

EFFECT OF TREATMENTS ON MORTALITY PERCENTAGE OF FULLY DRIED PLANTS

(Mean of four replications)

Tr.No.	Treatment	Stage I	Stage II	Stage III	Mean
1	20% NaCl	0.4125	72.25	89.25	162.0
2.	5% Soap Sol.	0.26	0.26	0.26	0.78
3.	20% NaCl + 1% Soap Sol.	0.3025	68.75	83.00	152.0
4.	Gramaxone(0.2%)	0.337	0.337	0.337	1.7
5.	Gramaxone(0.6%)	0.375	21.5	35.5	57.3
6.	Gramaxone+ (2,4,Na salt 0.6%)	0.31	0.31	0.31	0.93
7.	Gramaxone + 2,4 Na Salt (0.3%)	95.000	100	100	295
	Mean	**97**	**263**	**308.6**	

The above data was statistically analysed and the results obtained are given below:

	S.D.	C.D.(P = 0.05)
Stages	6.89**	14.0
Treatments	10.5**	21.4
Stage x Treatment	18.23**	37.0

** Significant at 1% level

a) Effect of Treatment:

Table XVII clearly shows that 20% NaCl and Gramaxone+ 2,4,D Na salt at 1 per cent level gave high mortality percentage followed by 20% NaCl + 1 per cent soap solution combination. The Standard division and critical differences showed that the treatments are significant at 1 per cent level.

b) Effect of Stages:

The treatments T_1 and T_2 showed the highest mortality in Stages III while Gramaxone at 0.6% and Gramaxone +2.4 D Na Salt at 0.3% showed highest mortality in Stage I. There is a significant difference between stages at 1 per cent level.

c) Interaction between stages and Treatments:

The interaction between stages and treatments was highly significant in all the three stages. The standard deviatiion and critical difference at 1 per cent level are presented in Table XVII.

ii) Effects of treatments on the mortality percentage of partially dried plants

TABLE XVIII

EFFECT OF TREATMENTS ON MORTALITY PERCENTAGE OF PARTIALLY DRIED PLANTS

(Mean of four replications)

TR. No.	Treatment	Stage I	Stage II	Stage III
1	20% NaCl	67.5	20.00	8.75
2	5% Soap solution	76.25	87.00	95.00
3	20% NaCl + 1% soap sol.	65.75	24.25	12.84
4	Gramaxone (0.2%)	71.5	68.25	68.25
5	Gramaxone (0.6%)	97.75	76.25	64.5
6	Gramaxone + 2,4, Na Salt (0.6%)	66.5	53.25	53.25
7	Gramaxone + 2,4,Na Salt (0.3%)	5	0.35	0.35

This above given data were statistically analysed and the data obtained are depicted below:

	S.D.	C.D.(P=0.05)
Stage	2.9**	5.8
Treatment	4.55**	9.23
Stage x Treatment	7.89**	16

**Significant at 1 per cent level.

Effects of Treatment:

The treatment by gramaxone+2,4D Na salt (0.3%) only had the lowest, partial mortality on Stage I.

Effects of Stages:

At Stage II, 5 per cent soap solution had the highest impact on mortality percentage of the plants.

Effect of Treatment and Stages:

The treatment 20% NaCl and Gramaxone +2,4 D Na Salt at 0.3% was more effective in Stage III.

iii) Effect of Treatments on the percentage of the plants with no effect

TABLE XIX

EFFECT OF TREATMENTS ON THE PERCENTAGE OF PLANTS WITH NO EFFECT PLANTS

(Mean of four replicaitons)

TR. No.	Treatment	Stage I	Stage II	Stage III
1.	20% NaCl	32.5	7.55	2.21
2.	5% Soap solution	23.5	12.25	5.07
3.	20% Nacl + 1% Soap solution	34.25	7.17	4.42
4.	Gramaxone(0.2%)	28.5	31.75	27.11
5.	Gramaxone(0.6%)	2.45	2.54	0.37
6.	Gramazone + 2,4 D Na Salt(0.6%)	31.00	46.75	46.75
7.	Gramaxone + 2,4, D Na Salt (0.3%)	0.35	0.35	0.35

The data in Table XIX was subjected to statistical analysis and the results obtained are shown below:

	S.D.	C.D.(P=0.05)
Stages	7.45**	15.00
Treatments	4.48**	9.09
Sgages x Treatment	7.78**	15.00

**Significant at 1 per cent level.

As seen in Table XIX percentage of the no effect plants was highest n gramaxone at 0.2% concentraiton, so the effect of the treatment on the mortality percentage of the parthenium is low.

STAGE I

STAGE II

STAGE III

Figure 17: Effects of 20% Nacl Treatment

Figure 18: Effects of 5% Soap Solution

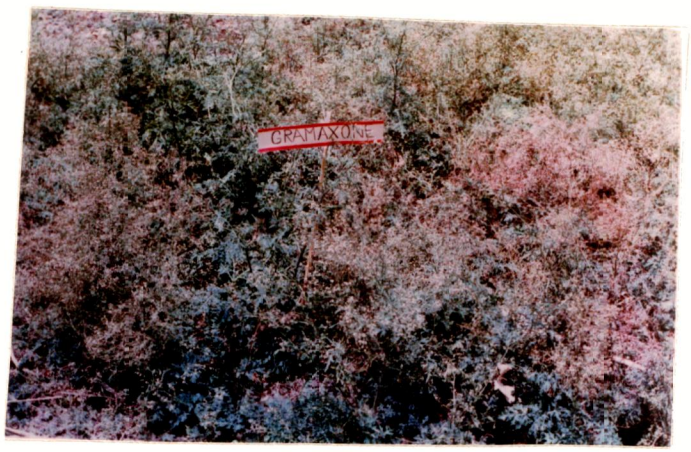
STAGE I

STAGE II

STAGE III

Figure 19: Effects of 20% Nacl + 1% Soap Solution

STAGE I



STAGE II

Figure 20: Effects of 0.2% Gramaxone

STAGE I

STAGE II

STAGE III

Figure 21: Effects of 0.6% gramaxone

STAGE I

STATE II

Figure 22: Effects of 0.6% gramaxone +2,4. DNa Salt

STAGE I

STAGE II

Figure 23: Effects 0.3% gramaxone +2.4.DNa Salt

TABLE XX

EFFECTS OF VARIOUS TREATMENTS ON THE GERMINATION PERCENTAGE, SHOOT LENGTH, ROOT LENGTH, WET WEIGHT AND VIGOR INDEX

(Mean of three replicaitons)

TR.No.	Treatments	Germination %	Shoot length (mm)	Root length (mm)	Wet weight (mm)	Vigor Index
	Control	100 (90.0)	4	3.33	3.30	330
1	20% NaCl	4.00	0.66	0.66	0.76	8.43
2	5% Soap Solution	4.00	0.33	0.33	0.66	8.60
3	20% NaCl + 1% Soap Sl.	20.00	0.66	0.06	2.66	80.00
4	Graxamone(0.2%)	17.00	0.83	0.83	2.10	50.00
5	Gramaxone (1%)	4.00	0.66	0.66	1.00	11.00
6	Gramaxone + 2,4, D Na salt(0.06%)	7.00	1.00	1.00	1.33	29.3
7	Gramaxone + 2,4,D Na salt(0.3%)	4.00	0.50	0.50	1.00	11.0
	S.D.	2.44**	1.00**	2.23**	4.26**	140.59**
	C.D.	5.23	2.145	6.735	9.137	142.735

The figuresin the parenthesis are the transformed values(using Arcsine table)

2. Germination percentage of seeds collected from treated plants

The effects of various treatments on the germination percentage of the seeds are presented in Table XX and Figure 24 were subjected to statistical analysis by randomised block design. Significant reduction in germination of seeds was noticed in plants treated with 20% NaCl, gramaxone, and gramaxone +2,4,D Na salt at 0.3% concentration when compared to control which registered the highest germination percentage(Appendix IV).

3. Comparision of root and shoot lengths of the germinated seedlings are presented in Table XX. The statistical analysis was done by using the randomised block design. It is clear from the statistical test that the root and shoot lengths of the seedlings differed significantly due to vairous treatments. The highest root and shoot lengths of the seedlings were recorded in the control plot where not treatment has been imposed. The lowest root and shoot length was recorded in treatments T_1, T_2 and T_7.

4. Wet weight of the seedlings:

The wet weight of the seedlings are depicted in Table XX when statistically analysed by using randomised block design the results showed that the

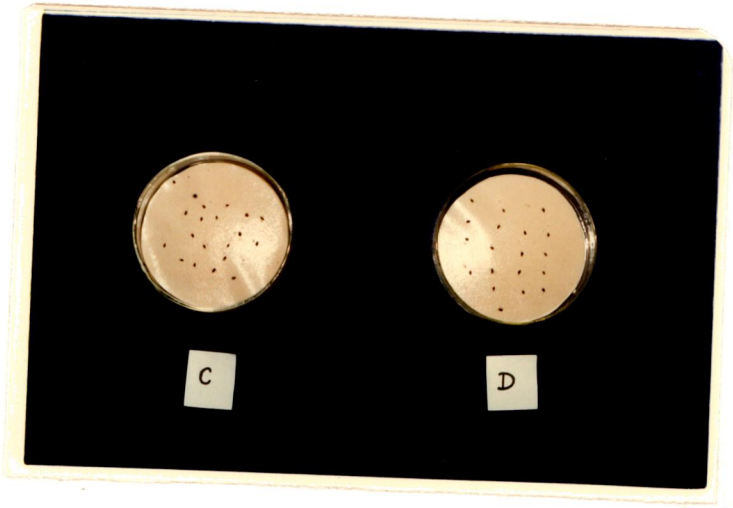


Figure 24: **Germination Percentage**

Figure 24: **Germination Percentage**

various treatments significantly influenced the wet weight of the seedlings. Treatment No. T_2 and T_7 had low plant weight when compared to control.

5. Vigor Index:

The vigor index of the germinated seedlings are given in Table XX which were statistically tested by using randomised block design. The test proved that treatments T_2 and T_3 had considerable control on the growth of the plant when compared to other treatments.

Summary and Conclusion

V. SUMMARY AND CONCLUSION

This study entitled "**Enhancing the Quality of Environment by Eradication of the Weed - Parthenium**", was carried out in two stages namely,

1. Findings of the household survey,

and 2. Findings of the experiments on parthenium eradicaiton.

The findings of the household survey revealed the following.

1) Eighty eight per cent of the homemakers were from nuclear family. All the selected samples were literates, but only 24 per cent were employed and rest 77 per cent were full time homemakers. Majority (66 per cent) of them belonged to middle income group ranging from Rs. 1200-1500.

2) The near environment of the homemakers showed that majority of them owned houses and resided in residential areas. Only 37 per cent of the homemakers expressed that they faced problems in their place of residence. Only 71 per cent were aware of their sensitivity to the surroundings.

3) The surroundings of their residence was envisaged by 42 per cent of homemakers as their near environment. Eighty two per cent mentioned man's total surrounding both natural and manmade constituted the total environment. Seventy four per cent of the homemakers considered that pure environment was important for healthy living.

4) Ninety nine per cent of the homemakers were aware about the degrading conditon of the environment and the major reasons for degradation were given as deforestation, poverty, industries and population explosion, followed by irresponsibility of man. Water was adjudged most polluted than land and air. The common health problems arising from pollutions were given as hcolera, diarrhoea and dysentry.

5) Thirty eight per cent of the homemakers considereed poisonous weeds and plants as environmental degrading factor. But majority (82 per cent) of the homemakers named parthenium as the menacing weed. The major health hazard due to parthenium as mentioned by the homemakers were allergy, skin irritation and asthma. About 52 per cent of the homemakers had taken measures to destroy parthenium weed. Only 19 per cent of the homemakers reported that their family members had allergic symptoms such as itching, rashes, sneezing, cold and asthma. Sixteen per cent attributed parthenium as the cause for the allergic symptoms.

6) Only 48 per cent of the homemakers were definite that it could be possible to completely eradicate this perinicious weed. The best method of parthenium eradicaiton as suggested by the majority of the homemakers were uprooting and burning (18 per cent) using chemicals (18 per cent) and mass action by the public (17 per cent).

7) The majority of the homemakers suggested that keeping the near environment clean by each family might be the best method of preserving the environment.

There exist environmental awareness among the homemakers, but there is the need to evoke greater sense of responsibility mong the homemakers to take initiative in practicing hygienic habbits to keep their surrounding clean and pollution free.

2. **Findings of the Experiments on Parthenium Eradication:**

The experiments conducted on Parthenium eradication were statistically appraised by Factorial Randomised Block Design, to find out the effects of treatments on the weed Parthenium.

(a) The effects of treatments on the mortality percentage of plants at different stages revealedd 20% NaCl and Gramaxone +2, 4, D Na Salt at 0.3% had highest mortality percentage followed by 20% NaCl + 1% Soap Solution, for the fully dried plants. The statistical appraisal done shhowed standard deviation and critical difference as significant at 1 per cent level.

The mortality percentage of partialy dried plants were highest in 5% soap solutions treatment and lowest in the treatment gramaxone + 2,4 D Na Salt at 0.6% The treatments were significantly different in all the three stage and between treatments at 1% level.

The effects of treatments on the percentage of plants with 'no effect' depicted gramaxone at 0.2% level as the treatment having highest percentage of no effect plants, the lowest being the gramaxone +2,4 D Na Salt (0.3%) followed by gramaxone (0.06%).

The effects of the treatments at different stages, reveals that the treatments 20% NaCl and 20 NaCl +1% soap were most effect at stage III, whereas the treatments gramaxone 0.6% and gramaxone +2, 4, D Na Salt at 0.3% was highly effective in Stage I itself.

The interaction between stages and treatments were highly significant in all the three stages viz. Stage I (24 hrs.), Stage II and Stage III(20 days).

(b) The effects of various treatments on the germination percentage of the seeds were subjected to statistical analysis by Randomised Block Design. Significant reduction in germination of seeds was noticed in plants treated with 20% NaCl, gramaxone and gramaxone +2,4,D Na Salt at 0.3% concentration. When compared to

to the homemakers, those who have larger areas can adopt gramaxone +2,4, D Na Salt at 0.3% level; to eradicate Parthenium around their residence.

This measured need to be widely popularized not only in the urban areas, but in the rural areas as well.

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Appendices

APPENDIX - I

INTERVIEW SCHEDULE TO ELICIT INFORMATION ON THE AWARENESS OF THE HOMEMAKERS REGARDING THE ENVIRONMENTAL CONDITON

Date:

I. **Socio-economic Information:**

1. Name of the investigator :
2. Name of the interviewee :
3. Name and address of the Head of the family :
   a) Door No. :
   b) Address :
4. Type of the family : Joint[ ] Nuclear [ ]
5. Detailed Information :

S.No.	Name of the family members	Relation to the head of the family	Age in years	Edu-ca-tion	Occu-pation	Income per month

6. Other source of income : Rs.per month

	Rupees Paise
a) Business saving :	
b) Receipts from property	
1. Land :	
2. Buildings :	
c) Income from investments :	
d) Allowance from parents :	
e) Other earnings :	
Total	

II. **Details Regarding the Environmental Condition:**

1. a) Locality of the house :

1. Urban 2. Rural

3. Semi-Urban

2. a) Place of Residence :

S.No. Place of residence	Problems caused or disturbances arised
1. Residential area	
2. Industrial area	
3. Near railway station railway lines	
4 Near textile mills	
5. Near factors/bakery	
6. Near river/lake/pond	
7. Commercial area	
8. Heavy traffic area	

b) Is the house

1. A separate unit with your own boundary wall?
2. A flat in any apartment?
3. Any other; specify

3. Are you sensitive to your surroundings?

Yes [ ] No [ ]

If Yes, how?

4. Is your house and kitchen well ventilated?

Yes [ ] No [ ]

5. What fuel do you use for the cooking purposes?

6. Your are a working women : Yes [ ] [ ]

If Yes, Is your working surrounding

a) Spacious (b) Hygienic

c) Congested/cramped (d) Well ventilated

e) Air condition

7. Do you face any problem in the area?

Yes [ ] No [ ]

If Yes, what is the problem?

III. **Environmental Awareness:**

1. What according to you is your environment?

a) The area where you live

b) The surroundings of your residence

c) The relationship of yourself with the surroundings where you live

2. a) Working conditions

   b) Man's total surroundings both natural and man-made

   c) Relationship of one living thing with another and their surroundings

   d) Relationship of land, air and water

3. Pure and clean environment is important for man's existence

   Yes [ ] No [ ]

   Why, Give reasons:

4. Are you aware that our environmental conditions are deteriorating?

   Yes [ ] No [ ]

5. What according to you are the reasons for this degradation?

   a) Industrial development

   b) Rapid growth of population

   c) Development of science and technology

   d) Vehicular emissions

   e) Irresponsibility of man

   f) Poverty

   g) Thermal power stations

   h) Nuclear reactors and arms

   i) Deforestation

6. Give reasons, how these factors are responsible for destruction of our environment?

   a) <u>Industrial Development:</u>

b) Rapid Growth of Population:

c) Vehicular Emmisison:

d) Irresponsibility of Man:

f) Poverty:

g) Thermal Power Station:

h) Nuclear Reactors/Arms:

i) Factories/Distilleries:

j) Deforestation:

7. What according to you are common area of pollution?

   1. Land
   2. Water
   3. Air

8. Which area of pollution do you think is most hazardours to existence of life?

Type of pollution	Hazards
a) Pollution of water b) Pollution of air c) Pollution of Land	

9. Do you feel that the destruction of forests are a cause towards the severe in climate in India?

Yes [ ] No [ ]

How?

10. Do you think that heavy pollution in some other country can effect the environment of our country?

Yes [ ] No [ ]

How? Specify.

11 What according to you should be the role of man to save the situation from further deterioration?

12. Weed and Poisonous Plants degrade the environment.

Yes [ ] No [ ]

How? specify.

13. Do you know that certain weeds and plants are poisonous and hazardrous to us?

Yes [ ] No [ ]

List some hazardrous weeds you know:

1.

2.

3.

4.

14. Are you aware that the weed 'Parthenium' is a menance to man?

How is it dangerous?

15. Do you have Parthenium within your surroundings?

Yes [ ] No [ ]

16. If Yes, do you take any measures, to control or destroy the plant?

Yes [ ] No [ ]

Specify measures:

Mention its source:

18. 'Parthenium' also has certain utilities

Yes [ ] No [ ]

If Yes, list the utilities

19. Give your suggestions for the destruction of 'Parthenium' from Coimbatore city.

APPENDIX III

STATISTICAL APPRAISAL OF THE EFFECT OF TREATMENTS ON THE MORTALITY PERCENTAGE OF PARTIALLY DRIEDPLANTS.

T. NO.	Treatment	STAGE I				STATE II				STAGE III				
		R_1	R_2	R_3	R_4	R_1	R_2	R_3	R_4	R_1	R_2	R_3	R_4	Total
1..	20% Nacl	61.3	38	54	72	23	27.9	23	32	15.34	22	17.4	13	399
2.	5% Soap Soln.	61.0	68.0	60	56	67	75	68	66.4	90	'77	74	75	837.4
3.	20% Nacl + 1% Soap Solution	54.3	50.2	66	47	33	37	15.3	30.0	36	22	9.97	3.44	404.1
4.	Gramaxone(0.2%)	53	54	64	61	50	52	64.1	57.4	50	52	64.1	57.4	679
5.	Gramaxone(1%)	76	80.3	90	80	76	50.1	76	50	74	27	70	50	809.4
6.	Gramaxone +2,4,D Na salt(0.3%)	48.4	54	57	66	44	46.1	51	47	44	46	51	47	601.5
7.	Gramaxone+2,4,D Na salt(0.6%)	14.2	16.4	9.97	9.97	3.5	3.2	3.72	3.09	3.5	3.2	3.72	3.09	78
	Total	368.2	361.0	401.0	402	296.5	291.3	301	285.8	313	249	290	248	3808

$$C.F. = \frac{(3808)^2}{84} = 172629$$

$$T.S.S. = 222925 - C.F.$$

$$= 222925 - 172629$$

$$= 50296$$

$$Tr.S.S. = \frac{2507825}{12} - 172629$$

$$= 208985 - 172629$$

$$= 36356$$

MEAN OF FOUR REPLICATIONS

T.No.	Treatment	STAGE I	STAGE II	STAGE III	Total
1.	20% Nacl	225	105.9	67.74	399
2.	5% Soap Solution	245	276.4	316	837.4
3.	20% Nacl + 1% Soap Solution	217.5	115.3	71.41	404.14
4.	Gramaxone (0.2%)	232	223.5	223.5	679
5.	Gramaxone (1%)	336.3	252.1	221	809.4
6.	Gramaxone + 2,4,D Na Salt (0.3%)	225.4	188.1	188	601.5
7.	Gramaxone + 2,4,D Na Salt(0.6%)	50.54	13.51	13.51	78
	Total	1531.74	1174.8	1101.16	3808

$$S.S.S. = \frac{ES_1^2 + ES_2^2 + ES_3^2}{28} - C.F.$$

$$= \frac{49389358}{28} = 172629$$

$$= 3761.6$$

Table I SS: (871860.6 ÷ 4)

= 217965 - 172629

= 45336

Trt. X ST

= 45336 - (SSS + Tr.S.S.)

= 45336 - 40118

= 5218

Error

E.S.S. = T.S.S. - (Tr.S.S. + R.SS + S.SS + Trt.St)

= 50296 - (45775.6)

= 45201

Treatment x Replication

T.No.	Treatment	R_1	R_2	R_3	R_4	Total
1.		99.64	87.9	99	117	399
2.		218	220	202	197.4	837.5
3.		123.3	109.2	91.2	80.44	404.14
4.		153	158	192.2	175.4	679
5.		226	157.4	236	190	809.4
6.		136.4	146.1	159	160	601.5
7.		21.2	22.8	17.4	16.2	78
	Total	977	901	996	936	3808

$$R.S.S = \frac{ER_1^2 + ER_2^2 + ER_3^2 + ER_4^2}{21} = C.F.$$

$$= \frac{3634442}{21}$$

$$= 173069 - 172629$$

$$= \underline{\underline{440}}$$

ANOVA	D.F.	S.S.	M.S.S. ss/df	F.Value
Replication	3	440	146.6	1.16^{NS}
Stage	2	3761.6	1881	14.9**
Treatment	6	36356	6059	48.3**
St. x Tr.	14	5218	372.7	2.96**
Error	36	4520	125.5	
Total	83	50296	605.9	

$SE = \frac{EMS}{4}$

$= \frac{125.5}{4}$

SE = 5.60

SD = 2 x 5.60

= 1.41 x 5.60

= 7.89

CD = 16 (t = 2.030)

Stage SE = $\frac{EMS}{4}$

$= \frac{125.5}{4 \times 7} = 2.12$

Treatment SE = $\frac{EMS}{4x3} = 3.23$

Stage

SD = 2 x 2.12

= 2.9

CD = 2.9 x 2.030

= 5.8

Treatment

SD = 2 x 3.23

= 4.55

CD = 4.55 x 2.030

= 9.23

ANOVA

S.No.	Anova	D.F.	S.S.	M.S.S. ss/df	F.Value
1.	Treatment	7	20	2.85	0.86^{NS}
2.	Replication	2	0.05	0.025	0.007^{NS}
3.	Error	14	46.41	3.315	
4.	Total	23	66.46	2.88	

$$S\,E = \frac{E.M.S.S.}{3}$$

$$= \frac{46.41}{3}$$

$$= 3.03$$

$$S\,D = 2 \times SE$$

$$= 2 \times 3.03$$

$$= 1.41 \times 3.03$$

$$= 4.26$$

$$C.D. = SD \times t$$

$$= 4.26 \times 2.145$$

$$= 9.137$$

APPENDIX IV

STATISTICAL APPRAISAL OF THE WET WEIGHT OF THE SEEDLINGS

TREATMENT NO.	TREATMENT	WET WEIGHT R_1 (mg)	R_2 (mg)	R_3 (mg)	Total
	Control	3.3	3.2	3.4	9.9
1.	20% Nacl	0	2.3	0	2.3
2.	5% Soap Solution	0	0	2	2.0
3.	20% Nacl + 1% soap solution	4	4	0	8
4.	Gramaxone(0.2%)	3	3.4	0	6.4
5.	Gramaxone + 2,4,D Na Salt(1%)	0	0	4	4.0
6.	Gramaxone(0.3%)	0	0	3	3.0
7.	Gramaxone + 2,4,D (0.6%)	3	0	0	3
	Grand Total	13.3	12.9	12.4	38.6

Correction Factor: $\frac{(GT)^2}{n} = \frac{(38.6)^2}{24}$

$$= \frac{1489.96}{24} = 62.08$$

Total sum square:

$$T.S.S. = (3.3)^2 + (3.2)^2 + (3.4)^2 + (2.3)^2 + (2)^2 + (4)^2 + (4)^2 + (3)^2 + (3.4)^2 + (4)^2 + (3)^2 + (3)^2 - C.F.$$

$$= 10.89 + 10.24 + 11.56 + 5.29 + 4 + 16 + 16$$

$$= + 9 + 11.56 + 16 + 9 + 9$$

$$= 128.54 - 62.08 = 66.46$$

Treatment Sum Square:

$$\text{Tr. S.S.} = \frac{(9.9)^2+(2.3)^2+(2)^2+(8)^2+(6.4)^2+(4)^2+(3)^2+(3)^2}{3}$$

$$= \frac{98.01 + 5.29 + 4 + 64 + 40.96 + 16 + 9 + 9}{3}$$

$$= 62.08$$

$$= \frac{246.26}{3} = 62.08$$

$$= 20$$

=====.

Replication sum square:

$$\text{R.S.S.} = \frac{(ER_1)^2 + (ER_2)^2 + (ER_3)^2}{8} = \text{C.F.}$$

$$= \frac{(13.3)^2 + (12.9)^2 + (12.4)^2}{8} = 62.08$$

$$= \frac{176.89 + 166.41 + 153.76}{8} = 62.08$$

$$= \frac{497.06}{8} = 62.08$$

$$= 62.13 - 62.08$$

$$= 0.052$$

=======

Error Sum Square:

$$\text{E.S.S.} = \text{T.S.S.} - (\text{Tr. S.S.} + \text{R.S.S.})$$

$$= 66.46 - (20 + 0.05)$$

$$= 66.46 - 20.05$$

$$= 46.41$$

========

Treatment x Replication

T.No.	Treatment	R_1	R_2	R_3	R_4	Total
1.		99.64	87.9	99	117	399
2.		218	220	202	197.4	837.5
3.		123.3	109.2	91.2	80.44	404.14
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	Total	977	901	996	936	3808

$$\text{R.S.S.} = \frac{ER_1^2 + ER_2^2 + ER_3^2 + ER_4^2}{21} = \text{C.F.}$$

$$= \frac{3634442}{21}$$

$$= 173069 - 172629$$

$$= 440$$

AVONA	D.F.	S.S.	M.S.S. ss/df	F.Value
Replication	3	440	146.6	1.16^{NS}
Stage	2	3761.6	1881	14.9**
Treatment	6	36356	6059	48.3**
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Treatment

SD = 2 x 3.23

= 4.55

CD = 4.55 x 2.030

= 9.23