PERSPECTIVES ON ENVIRONMENT DEGRADATION AND AGRARIAN CRISIS IN INDIA

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Ideal International E-Publication Pvt. Ltd.

Pravara Medical Trust's

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Proceedings of Seminar on

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2018

Ideal International E – Publication Pvt. Ltd.

www.isca.co.in

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Title:	Proceedings of Seminar on Perspectives on Environment Degradation and Agrarian Crisis in India.
Editor(s):	Dr. Onkar Rasal, Dr. Yuvraj Patil Narawade
Edition:	First
Volume:	I

ISBN: 978-93-86675-30-9

PREFACE

Economic development during post reforms period have drastically change an environment of the country. According to the models of economic growth and development; development at the cost of environment will never helps to achieve the goal of inclusive and sustainable development. Mere negligence of the agrarian and environmental issues in the policy domain will further worsen the situation. Day by day declining quality of the environment will leads to the multiplier effects on the factor productivity. This has further increase in the cost of production as well as declining production. And lastly it has resorted at the grave issues like unemployment and inflation. In this situation the agrarian community suffers badly.

Agrarian relations in India had undergone a sea-change during the period of green revolution in general and to that of last two decades of economic reforms in particular. One of the serious outcomes of these changes is the incidence of suicides of farmers in different states of the country. Changes in agrarian relations occurred due to the changing policies and change in ecology. Changing macroeconomic policies and other changes led to the gross neglect of agriculture consisting of 60 per cent of the population and one fifth of the electorate. This took agriculture and rural economy towards distress. The number of suicide cases in rural parts has been mounting in last fifteen years. During the period of 1995 to 2012 (2, 87, 967) farmers has been committed suicide in the country. Since the mid 1990s, large section of farm households have been facing a distress as a consequence of decline in agricultural income and loan repaying capacity and increased debt burden. Rain-fed areas are particularly prone to year to year fluctuations in production and degradation in environmental resources. In the present book we tried to analyze and criticize the reciprocal relationship between the agrarian reforms and environmental degradation. As well as it also focuses on the functional relationship between climate changes, declined agricultural productivity, unremmunarative profession and thereby agrarian crisis and farmers suicides in India.

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Nesting & Foraging behaviour of *Apis dorsata* in Shevgaon

Makasare Sachin Petras*

Abstract :-

Entomology is the study of insect. It has two branches, the classical & applied entomology. The applied entomology deals with the economic importance of insects. Apiology is an important branch of applied zoology that deals with the study of honey bees including bee keeping. Honey bees life revolves around the phenomenon of foraging i.e. collection of nectar, pollen & often water for their sustenance. The foraging activity automatically results in to pollination of flowers bee visit. Bees are prime pollinators among other agents of pollination. Thus bees when kept for economic consideration are also responsible for additional benefits in the form of natural increase in yield. Therefore, bees have an important role to play in promoting agro forestry & horticulture.

Rock bees preferably select large trees for their nesting size. They preferably construct large size comb on same place or on the single trees i.e. more than one hives are constructed on single tree or the same place. A bee is considered to be excellent bio indicator & therefore their presence in urban location indicates relatively better status of the flora & the climate. But it's strongly recommended that necessary steps need to be taken to provide appropriate habitat to the rock bees.

Introduction :-

Honey bees are social insects, live in a colony, exhibit polymorphism & show division of labour. Their life revolves around the phenomenon of foraging for their substance thus they are prime pollinators. The pollination services by bees is advantageous in increasing crop yield & additionally obtaining the bee products namely honey, bee wax, pollen, royal jelly & bee venom. These products find usages as food, nutritive supplements, medicines & raw materials for the production of various goods.

Key Words:- Nesting & Foraging Behaviour, Pollution Affect.

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Taxonomic position of Rock bee :-

Phylum : Arthropoda
Class : Insecta (Hexapoda)
Subclass : Pterygota
Division : Endopterygota
Order : Hymenoptera
Super family : Apoidea
Family : Apidae
Sub family : Apinae
Tribe : Apini
Genus : *Apis*
Species : *A.dorsata*

Apis dorsata*(Rock Bee*):-

***Apis dorsata* is a honey bee of Southern & South-eastern Asia. It is only slightly smaller than the Himalayan honey bee.**

In the wild, they prefer to nest in exposed areas far off the ground, on tree branches & under cliff overhangs & sometimes on buildings. They are aggressive bees which have never been domesticated. Each colony consist of single vertical comb suspended from above & the comb is typically covered by a dense mass of bees shows warning posture thus creating a visible ripple effect across the face of the comb in an almost identical manner to an audience wave at a crowded stadium.

***Apis dorsata* has a four subspecies i.e**

***Apis dorsata dorsata*(primarily from India)**

***Apis dorsata binghami Cockerel* (Indonesia honey)**

***Apis dorsata breviligula Maa* (Philippines)**

***Apis dorsata laboriosa Fabricius* (Himalayan honey bee)**

Habit & Habitat :-

The Rock bees construct hive on the large trees, building edges, overhanging rocks, arches of bridges etc. The hives are invariably always at inaccessible location, always exposed to sunlight, large sized comb colony.

The rock bee now a day's often found in urban areas particularly overhanging the edges of huge buildings, water tanks & trees. The urban location is due to destruction of

forests & thereby losses of habitat further urban areas often have a large variety of cultivated flora that provide avenue for foraging to the bees

Nesting behaviour:-

These bees build single large comb, exposed to day light. The comb is attached to the underside of horizontal branch of a tall tree, overhanging rocks the arches of bridges or even edges of buildings. The comb is large about 1.5- 3.0 ft long & 0.5- 2.5 ft tall in length. The worker & drone brood cells are identical in size. The comb has hexagonal cells about 18.75 cells measuring 4 linear inches. The average thickness of brood comb is 3.2 cm & surplus honey storaging area may be 22.86 cm in thickness.

They construct hive at least at the height 8-10m. They preferably construct the comb on same place or on the single trees i.e. more than one hive is constructed on single tree or the same place.

Foraging behaviour:-

Honey bees gather pollen from flowers to use as source of protein food. Pollen grains are microscopic usually about 15-100µ & just a pinch of pollen powder contains thousands of grains of pollen having sticky coating which help to attach them to the hairy insect. Foragers pack pollen into the boll in the pollen basket on each hind leg. These bolls of pollen are called pollen loads. On return to their hive the bee stores the pollen in the comb. Pollen is an indicator which enables researchers to study the phytogeography of plant evolution, climate, plant insect relationship & botanical, geographical origin of bee product.

Worker bees visit flowers & collect nectar. The mouth parts of bee form a tube which can probe into flower to reach nectaries. Nectar is sucked up, stored temporarily in gut, then taken to the hive & pass on the bee house. The bees process the nectar to form honey. Foraging requires good navigation abilities, the bee must be able to find its way back home after venturing out which may take it away from visual or auditory contact with the nest & its residents. Honey bees may forage several kilometres from their hive making them a good model species for studying navigation in central place foragers. Information used in home based navigation can be Egocentric & Geocentric. Egocentric information in generated internally by the bee & is dependent on its immediate surroundings while Geocentric information includes land marks & any maps information available to the animal. A honey bee primarily uses path integration in making their way to from foraging sites.

The foraging process begins in a colony by scout bees being sent to such promising flower patches. Scout bees moves randomly from one flied to another during the harvesting season. A colony can extend itself over long distance up to 14 km & multiple directions simultaneously to exploit a large number of food sources. In principle flower patches with plentiful amounts of nectar or pollen that can be collected with less effort should be visited by more bees where as patches with less nectar or pollen should receive fewer bees.

Honey bees are active throughout year except during extreme winter season. In nature bee hives with rich population are observed hanging down from the branches of trees & ceiling of old & new RCC constructed houses. The worker bees communicate the information for the location of the food source through the round & tail- wagging dance. The dance information provides outgoing bees with a distance & direction to travel. Flight to be taken, flight direction is determined by sun compass orientation & distance by dance input. Once a route is learned bees incorporate visual land marks when they make repeat trips to a foraging site.

Water Collection:-

Water collection mechanisms have a specific function i.e. cooling. The bees collect drop of water from irrigated areas like water tanks, water tap and droppings of different types of cannel & stagnate water etc. and other bees place the drop of water all over the nest. They regulate & control the temperature, humidity of the hive.

Swarming:-

Rock bees migrate regularly during the year. The swarm migrate to new areas if availability of nectar & pollen sources. They also migrate when the ambient temperature drops down about 14^0c & when industrial scoots flow are strong i.e. polluted climatic conditions.

Swarms emigrated leaving small white comb when the honey flow started, the colonies grew up & prepared themselves for swarming bees make queen cells hang down on the lower edges of the nest. After a swarm left a colony, the curtain became thinner & disappeared. The bees migrated when all workers emerged from the comb & new queen ability to lay eggs then them emigrated, fly around searching landing & behaving in agitated manner with the help of traces of combs, wax, propolis from previous years.

Materials & Methods:-

The paper is based on repetitive field visit making observation & collecting data on foraging & nesting behaviour. The material requisite essentially includes a digital camera, field binocular & data collection book.

The methodology includes – fortnightly visits to the various locations of the outsides of city that have rock bees hives. Once determined, the bee flora & the necessary details of flora, foraging behaviour of bees & the morphometric details of the nest were collected.

Observation & Result:-

Table 1:- Bee Floral Calendar with information on pollen & nectar.

Sr. No	Name of Species	Common name	Family	Source of N/P	Foraging Frequency		
					Morning	Afternoon	Evening
1	Peltophorum pterocarpum Becker	Copper Pod	Fabaceae	N/P	+ + +	+ +	+ +
2	Azadirachata indica	Neem Tree	Fabaceae	N/P	+ +	+ +	+ + +
3	Jacaranda mimosaefolia	Nil Gulmohar	Fabaceae	P	+ + +	+	+
4	Delonix regia Rafin	Gulmohar	Fabaceae	P	+ + +	+ + +	+
5	Derris indica	Karanj	Fabaceae	N	+ +	+ +	+ +
6	Acacia arabica	Babhul	Leguminosae	N/P	+ + +	+ + +	+ + +
7	Ficus religiosa	Pimpal	Bignoniaceae	N/P	+ +	+ +	+ +
8	Albizia lebbeck	Shirish	Bombacaceae	P	+ +	+ +	+ +
9	Tectona grandis	Teak	Verbenaceae	N/P	+ + +	+ +	+ +
10	Moringa oleifera	Drumstick Tree	Proteaceae	N/P	+ +	+	+
11	Ficus benghalensis	Vad	Moraceae	P	+ +	+	+
12	Mangifera indica	Mango	Mimosaceae	N	+ + +	+ + +	+ +
13	Tamarindus indica	Tamarind	Caesalpiniaceae	P	+ + +	+ + +	+ + +
14	Punica granatum	Dalimb	Punicace	P	+ + +	+ +	+ +
15	Psidium guajava	Guava	Myrtaceae	N/P	+ + +	+ + +	+ +
16	Emblica officinalis	Avala	Bromeliaceae	P	+ +	+ +	+ +
17	Achras sapota	Chiku	Fabaceae	N/P	+ + +	+ +	+ +
18	Annona squamosa	Custard Apple	Fabaceae	P	+ + +	+ +	+ +
19	Feronia limonia swingle	Wood Apple	Rutaceae	N/P	+ +	+ +	+ +
20	Carica papaya	Papaya	Caricaceae	N	+ + +	+ +	+ +
21	Michelia champaca	Sonchampa	Meagnoliacea	P	+ + +	+ +	+ +
22	Catharanthus roseus	Sadafuli	Apocynaceae	N	+ + +	+ + +	+ + +
23	Nyctanthes arbortristis	Parijatak	Verbenaceae	P	-	+ +	+ + +
24	Caesalpinia pulcherrima	Shankasur	Fabaceae	P	+ + +	+ + +	+ +
25	Jasminum grandiflorum	Chameli	Oleaceae	N/P	+ + +	+ +	+ + +
26	Canna indica	Kardal	Cannaceae	P	+ +	+ +	+ +
27	Ricinis communis	Erandel	Euphorbiaceae	N/P	+ +	+	+ +
28	Cestrum nocturnum	Raatrani	Solanaceae	N/P	-	+ +	+ + +
29	Cocos nucifera	Coconut Tree	Arecaceae	N/P	+ + +	+ + +	+ + +
30	Thespesia populnea	Ranbhendi	Caesalpiniacene	P	+ +	+ +	+ +

31	**Leucaena leucocephala**	**Subabhul**	**Mimosaceae**	**N**	**+ +**	**+**	**+**
32	**Millingtonia hortensis**	**Buchache zad**	**Bignoniaceae**	**P**	**+ +**	**+**	**+**

N.B

Heavy Foraging Visits + + +

Moderate Foraging Visits + +

Minimal Foraging Visits +

Table 2:- *A.Dorsata* colonies include location & dimension of the nest.

Sr. No	Location (Shevgaon outside area up to 15km)	No. of colonies in different location	Nest size (Approx.)	Height from ground level (Approx.)
1	Shevgaon - Ghotan	1 1 1	70x20 70x25 68x23S	22 26 24
2	Shevgaon - Bodhegaon	1 1 1	60x29 73x30 70x27	26 25 22
3	Shevgaon - Kukana	1 1 2	65x20 68x22 70x20,70x25	21 22 25
4	Shevgaon - Amarapur	2 1 2	67x22,70x27 80x25 75x27,70x25	26 28 25
5	Shevgaon - Samangaon	1 3 2	70x20 75x27,70x25,68x23 80x26,70x10	22 24 23

Conclusion:-

Less number of colonies in industrial area is surprise element in observation. This essentially indicates the presences of green zone but pollution influencing the bee's thereby inappropriate habitat for the bees. Interestingly green zone & water irrigated area have more number of colonies, to be specific – 5 colonies in small area. This perhaps is because of the avenue tree plantation & green zones provide the forage. The pollution in industrial areas does not seem to be influencing the bees much; this indicates the levels of pollution are tolerable. The number of colonies under normal circumstances should have been at least 5 times more. This could be a positive indication of the right kind of vegetation flourishing in the area. The planting of bee

flora therefore should be encouraged & efforts need to be taken to protect the colonies from barbarian ways of harvesting.

It is strongly recommended that necessary steps need to be taken to provide appropriate habitat to the rock bees. A large number of bee colonies ultimately indicate positive signals to the wild flora & crop lands around the city. All efforts need to be taken to encourage *A.dorsata* colonies around the city.

References :-

- **Penn State - Liam Jackson 2016**
- **Jose D. Fuentes, Bicheng Chen - Atmospheric Environment 2016; D**
- **Molly Michelson, Guy Poppy - Nature Scientific Report 2013**
- **Imms 1997**
- **Sardar Singh 1962**
- **Engel 1999**
- **Lakshmi. K 1999**
- **Arias & Sheppard 2005**
- **Thapa et al 2000**
- **Lindaur 1957**

About the Editors

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Is presently working as a Assistant Professor and Head Department of Economics of PMTs' Arts, Commerce and Science College Shevgaon. He holds his doctoral degree in Economics in 2011. He is having 15 years of an experience of teaching economics at higher education level. He published 4 books and 9 research papers. He is also with the several associations in economics.

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Is working as Assistant Professor at PIRENS, Institute of Business and Management Education, Loni. He was Member of Management Council of Savitribai Phule Pune University Pune. He is obtained his doctorate in Management in 2016. He is member of several academic bodies of various universities in Maharashtra.

Uncertainty and adequacy are the fundamentals characteristics of the indian monsoon. variations in the mansoon affect the agricultral production. However, the agricultural in maharashtra is camparatively developed in india. But at the same time, there have been huge amount of disparities in agrucultural development in the state. Adequate irrigation facilities are the prerequisite for the sustainable development of the sector. Over the year s there is increase in number of failure of indian mansoon. It is an outcome of the changing nature of climate and moreover, the increase in temperature of earth surface. I strongly believe that to come up with the problem we need along term constructive policy measure. As well as the people participation is the prerequisite while coping with the problem of climate change. I congratulate the orgniser for the conducting the academic discussion on this burning issue. The academic debate on this vital issue will be helpful for designing the long term policy on climate change and Agrarian Crisis. I wish greate success for these seminars.

Hon'ble Dr. Rajendra Vikhe Patil

Trustee And Secretory Pravara Medical Trust , Loni

Pro vice Chancellor, PIMS, (Deemed University) Loni