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JIGNASA is a programme designed by the CCE to inculcate the culture of research among the students right from their under graduation. Students from all departments of Tara Govt College regularly participate in this state level programme and also won so many state level best project awards over the years.

ENGLISH DEPARTMENT:

CERTIFICATES OF PARTICIPATION/MERIT:





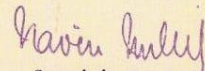
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Certificate of Merit

This Certificate is awarded to **Mr. Shareef Miya**, Assistant Professor of English, **Tara GDC Sangareddy**, in recognition of his Outstanding Role as a Supervisor for Jignasa- State Level Student Study Projects Presentation on the topic **Why can't I Speak English?** in English for the academic year 2018-19.


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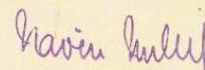
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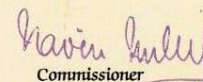
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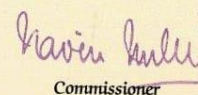
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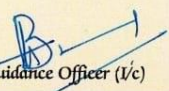


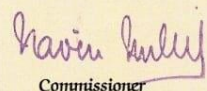
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Certificate of Participation

Awarded to

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for Supervising Students' Study Project on

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for presenting study project on

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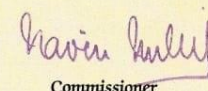
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PHOTOS:















DEPARTMENT OF ECONOMICS

JIGNASA: 2018-19

TARA GOVERNMENT COLLEGE (A), SANGAREDDY

JIGNASA STUDENTS STUDY PROJECT

ON

**IMPACT OF GOVERNMENTS NEW INITIATIVES ON FARMERS
SUICIDES IN TELANGANA STATE**

Sl. No.	Roll No.	Name of the Student	Group/Cla ss	Cell No.	Remarks
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5.	6058-18-129-533	M. Naresh	BA HEP II Year	7569324144	
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TARA GOVERNMENT COLLEGE (A), SANGAREDDY



Re-Accredited with “B” grade by NAAC

Department of Economics

FINAL REPORT OF STUDENT STUDY PROJECT: 2019-20

(అంశం 5లో అంశం 2 ద్వారా)

TITLE OF THE PROJECT (ద్వారా అంశం)

**IMPACT OF GOVERNMENT’S NEW INITIATIVES ON FARMER
SUICIDES IN TELANGANA STATE**

(“అంశం 5లో అంశం 2 ద్వారా ఆంధ్రప్రదేశ్ లోని రైతు ఆత్మహత్యలపై 2020 అక్టోబరు నాటికి”)

By the students:

1. **V. JABILI** BA HEP III YEAR
2. **M. KIRAN KUMAR** BA HEP II YEAR
3. **G. RAJITHA** BA EPCA II YEAR
4. **M. PRIYANKA** BA HPE II YEAR
5. **M. NARESH** BA HEP II YEAR
6. **SAHITHI** BA HEP I YEAR

Supervisors

DR. A. VENKATESHAM M.A., Ph.D.

DR. G. JAGADISHWAR M.A., Ph.D.

Asst. Professors of Economics



DECLARATION

We, the following mentioned students, hereby solemnly declare that the students study project entitled “**IMPACT OF GOVERNMENT’S NEW INITIATIVES ON FARMER SUICIDES IN TELANGANA STATE**” was prepared by us as part of students study project. We also affirm that this record is the summative effort of our team under the guidance of **Dr. A. Venkatesham** and **Dr. G. Jagadishwar**, Assistant Professors of Economics, Tara Government College (A), Sangareddy. We confess that this work was not submitted anywhere.

V. JABILI	BA HEP III YEAR
M. KIRANKUMAR	BA HEP II YEAR
G. RAJITHA	BA EPCA II YEAR
M. PRIYANKA	BA HPE II YEAR
M. NARESH	BA HEP II YEAR
D. SAHITHI	BA HEP I YEAR

ACKNOWLEDGEMENTS

At the outset, we humbly express our deep sense of gratitude to the Principal **Dr. ChandraMukherji** for providing an opportunity to undertake this student study project in Economics.

We are highly indebted to our guides Dr. A. Venkatesham and Dr. G. Jagadishwar Assistant Professors, Department of Economics, TARA Government College (A), Sangareddy for their kind encouragement, affectionate enquiry, timely directions and guidance in completing this project work in time.

We are highly indebted to Sri. A. V. Sharma, Assistant Professor of English for his kind encouragement in completion of it to its logical end.

We are grateful to Sri. T. Baskar Reddy, Assistant professor of Economics, GDC(W) Nalgonda, Sri. G. Syam, Assistant Professor of Economics, Giriraj Degree College, Nizamabad, and their students for their support in collecting the data in their respective districts.

We have received strong support from the concerned officials of Department of Agriculture and other concerned departments of Telangana state. Special thanks to our faculty in the Tara Government College for their constant support.

V. JABILI	BA HEP III YEAR
M. KIRANKUMAR	BA HEP II YEAR
G. RAJITHA	BA EPCA II YEAR
M. PRIYANKA	BA HEP II YEAR
M. NARESH	BA HEP II YEAR
D. SAHITHI	BA HEP I YEAR



TARA GOVERNMENT COLLEGE, SANGAREDDY
(Autonomous)

(Re-Accredited with "B" grade by NAAC)



Sangareddy District, Telangana-502001, India

Dr. Chandra Mukherji
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CERTIFICATE

This is to certify that the Student Study Project entitled “**IMPACT OF GOVERNMENT NEW INITIATIVES ON FARMERS SUICIDES IN TELANGANA STATE**” is a record of original work done by the students of this college namely **V. JABILI**, BA HEP III YEAR, **M. KIRANKUMAR**, HEP II YEAR, **G. RAJITHA**, EPCA II YEAR, **M. PRIYANKA**, BA HPE II YEAR, **M.NARESH**, HEP II YEAR AND **D. SAHITHI** of BA HEP I YEAR. It is a bonafide work undertaken under the guidance of Dr. A. Venkatesham and Dr. G. Jagadishwar, Assistant Professors of Economics of this college.

Sangareddy

Principal



TARA GOVERNMENT COLLEGE, SANGAREDDY
(Autonomous)



(Re-Accredited with “B” grade by NAAC)
Sangareddy District, Telangana-502001, India

CERTIFICATE

We are hereby solemnly certifying that the Student Study Project in Economics entitled “**IMPACT OF GOVERNMENT NEW INITIATIVES ON FARMER SUICIDES IN TELANGANA STATE**’ is a record of original work done by the students of this college, namely **V. JABILI**, BA HEP III YEAR, **M. KIRANKUMAR**, BA HEP II YEAR, **G. RAJITHA** BA EPCA II YEAR, **M. PRIYANKA**, BA HPE II YEAR, **M. NARESH** BA HEP II YEAR AND **D. SAHITHI** of BA HEP I YEAR under our guidance. It is a bonafide research work undertaken by the above said students of this college.

Sangareddy

Dr. G. Jagadishwar

Dr. A. Venkatesham

December 2019



Student Study Projects

TARA GOVERNMENT COLLEGE SANGAREDDY

(AUTONOMOUS)

**IMPACT OF GOVERNMENT'S NEW INITIATIVES ON FARMERS
SUICIDES IN TELANGANA STATE**

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INTRODUCTION:

The Student Study Project entitled **“IMPACT OF GOVERNMENT’S NEW INITIATIVES ON FARMER SUICIDES IN TELANGANA STATE”** was carried out by a group of students of TARA Government College (A) Sangareddy under supervision Dr. A. Venkatesham and Dr. G. Jagadishwar, Asst. Professors of Economics.

Agriculture is a predominant sector in Indian economy. It has been facing various problems such as low productivity, lack of financial and marketing facilities and lack of unity among farmers. Low productivity, uncertainty and other causes lead to farmer suicides.

Farmer suicides became a major concern in Telangana State as well as in India that has resulted in profound implications on the farmers quality of life. According to NSSO’s Situation Assessment Survey in 2003 and 2013 and National Crime Records of Bureau (NCRB) in 2015,

the deterioration of farmers and rural artisans' household status was clearly brought out. The five states, Maharashtra, Telangana, Madhya Pradesh, Chhattisgarh and Karnataka, together accounting for 90 per cent of farmer suicides (5056) during 2014. The unfortunate incidence of farmer suicides continued in the subsequent years despite the efforts made by the Central and State Governments. But among these states, reduction in farmer suicides was observed in Telangana state in recent years.

Many research studies addressed the causes for farmer suicides from various angles. A detailed perusal of the literature in India suggests various causes for building the agrarian distress. This may be due to the pressure of increasing cost of cultivation, climatic factors, low productivity and market failures both in factor and product markets. But among these, the farmer indebtedness was considered as the major triggering factor by analysts.

But the present study focused on reduction of farmer suicides and the major causes for this good augury in Telangana state. Even though rural indebtedness along with low productivity and market failures have triggering the agrarian distress, farmer suicides come have down due to implementation of new programmes initiated by Telangana state as well as Central Governments.

In order to prevent farmers suicides and the distress of agriculture, Central and State Governments implementing several schemes. The prominent among them were Rythubandu scheme, RythubheemaPathakam and Aasara Pension scheme by the Telangana State and Pradhan Mantri Fasal Bheema Yozana and other schemes by Central Government. As a result of this farmers suicides recently dropped in our state.

REVIEW OF LITERATURE:

Anneshi and Gowda (2015) found that both small and medium farmers borrowed relatively higher proportion of the non-institutional credit sources as compared to institutional sources. Accessibility to institutional borrowing is relatively lower for small farmers and higher for large farmers.

Bhende and Thippaiah (2010) concluded that most of the farmers in the suicide-prone districts of Andhra Pradesh, Karnataka, Kerala and Maharashtra states were aware of the PMs package and benefited from it. However, their capacity to cope with the drought conditions has been weak and the PM's package through its multiple schemes had limited positive impact on this front.

-
1. *Anneshi, R. and Gowda, N.K. (2015). An Economic Analysis of Rural Indebtedness of Farmer House Holds: A House Hold Study in Davanagere District of Karnataka. Indian Journal of Research. 4(7), pp.285-287*
 2. *Bhende, M.J. and P. Thippaiah. (2010). An Evaluation Study of Prime Minister's Rehabilitation Package for Farmers in Suicide-Prone Districts of Andhra Pradesh, Karnataka, Kerala and Maharashtra, Agricultural Development and Rural Transformation Centre (ADRTC), Institute for Social and Economic Change, Bengaluru.*

Dominic Merriott (2017) stated that the socioeconomic factors are an important cause to farmer suicides. His study found increased rural indebtedness playing the predominant role among the causative factors.

Profulla Kumar Dass, and Gajendra Prasad Parida (2005) have felt that the government programs become meaningless in a context where the women and farmers of Scheduled Castes suffer from mal-nutrition, torture and exploitation by money lenders as well as low wage affect their socio and economic life.

Rajani Adikarla (2019) stated that following the implementation of loan waiver programme (LWP), the incidence of suicides has not stopped completely and LWP cannot be a solution to reduce the distress condition of small landholders and tenant farmers.

-
1. *Dominic Merriott. (2017). Factors Associated with the Farmer Suicide Crisis in India", Journal of Epidemiology and Global Health, 6, pp.217– 227.*

2. *Profulla Kumar Dass, and Gajendra Prasad Parida, "Socio-economic conditions and status of Dalit women in Orissa: A study of Nayakhandi village", Vision Jaiprakash Narayan, Institute of Social and Economic Studies, Bhubanashwar, Vol. 23, No. 3-4, pp. 108-112, 2005.*
3. *Rajani Adikarla, "Farm loan waiver didn't stop suicides completely" Centre for Economic and Social Studies, Jan 2019.*

Gaps in the earlier studies:

It is observed that the earlier studies suffer from the following gaps which include:

1. No attempt is made to evaluate the development programmes meant for socio-economic development of farmers in Telangana with a focus on impact of Government's new initiatives on farmer suicides.
2. The social and economic implications of Government programs for agriculture development, in this context, are not found.

Significance of the project:

The study will find out the relevance and contribution of the new initiatives introduced in the agriculture sector in order to increase the production in agriculture and improve the benefits of the farmers, which in turn reduce farmers suicides in the Telangana state.

Objectives:

With this background, the study addressed following specific objectives:

1. The broad objective of the study is to evaluate the new agriculture development initiatives in Telangana state.
2. To critically examine the benefits and impact of the new initiatives in achieving a reduction of farmers suicides.

Hypotheses:

1. New agriculture development initiatives have directly influenced the agricultural production which is accompanied by a rise in real income of the farm families.
2. There is an accountable effect of governments' new programmes on decline of farmer suicides.

Methodology:

Stratified random sampling was done for the collection of primary and secondary data. Questionnaire was prepared and administered for the required data. The analysis of data supported the hypotheses.

Hundred beneficiaries of government new programmes were selected from four districts namely, Sangareddy, Nalgonda, Warangal and Nizamabad. 25 sample respondents will be drawn from each district. The beneficiary units were selected mostly by adhering to the principle of stratified random sampling.

Sources of Data:

The present study made use of both primary and secondary sources of data towards the end of objectives and hypothesis.

The secondary sources of data included the Socio-Economic Repots of Telangana State and the Reports of Ministry of Agriculture, both Govt. of India and Govt. of Telangana and Reports of National Crime Records Bureau, Ministry of Home Affairs, Govt. of India.

The primary data were collected directly from the respondents by administering a pre-designed questionnaire/schedule among the respondents located as stated.

Period of Study:

The present study considered 5 years between 2014-2019 to capture the budget of the financial assistance provided in implementing various programmes by the government of Telangana.

Scope of the Study:

Although, the government financial assistance to many programmes, the present study confines itself only to the programmes which have impact on farmers suicides.

Techniques of Analysis:

The present study made use of simple percentages, graphs, simple correlation in order to test and explain relationships specified in the study.

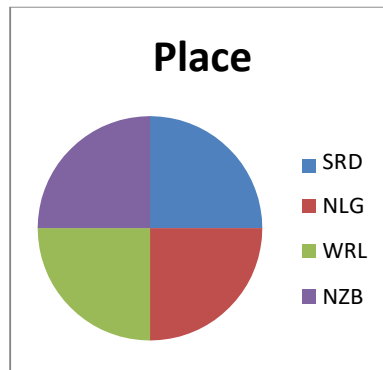
SOCIO-ECONOMIC PROFILE OF THE SAMPLE UNITS:

An attempt is made in this chapter to analyze the socio-economic profile of the sample units. This profile includes: **Place, Age, Education, Gender, Economic Status, Occupation and Nature of the family**

Results and Analysis:

Table-1 PLACE

Place	Frequency	Percent	Cumulative Percent
Sangareddy	25	25.0	25.0
Nalgonda	25	25.0	50.0
Warangal	25	25.0	75.0
Nizamabad	25	25.0	100.0
Total	100	100.0	



Out of the 100 sample units, 25 percent are drawn from each district.

Table-2 AGE

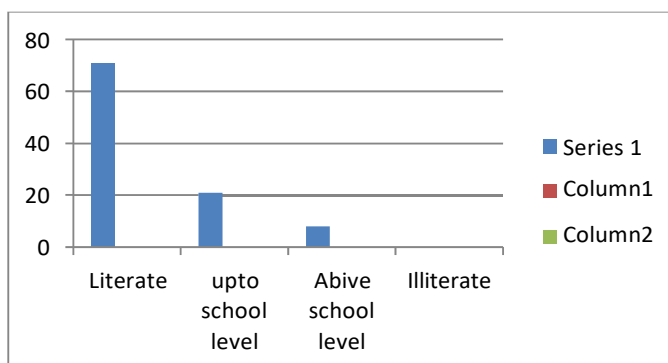
Years	Frequency	Percent	Cumulative Percent
Up to 30	35	35.0	35.0
31-50	55	55.0	90.0
Above 50	10	10.0	100.0
Total	100	100.0	

It is observed that 55 percent of sample unit farmers are found in the age group of 31-50 years followed by 35 percent from the age range of up to 30 years and 10 percent respondents are found to be relatively elders.

Table-3 EDUCATION

Education	Frequency	Percent	Cumulative Percent
Literate	71	71.0	71.0
Up to School level	19	21.0	92.0
Above School level	08	8.0	100.0
Illiterate	0	0.0	
Total	100	100.0	

Source: Primary data

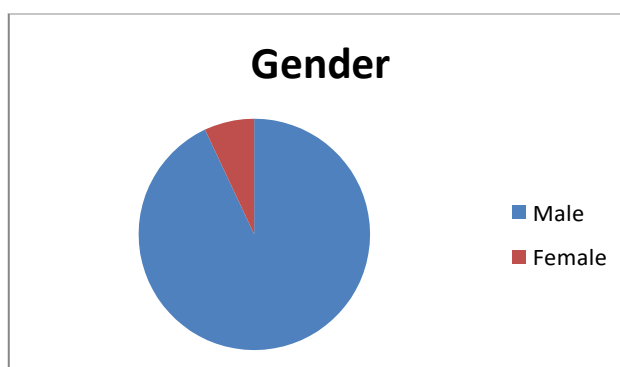


It is observed that 71 percent are just literates followed by 21 percent are equipped with up to school level education and 8 percent respondents with above school level education.

Table-4 GENDER

Years	Frequency	Percent	Cumulative Percent
Male	93	93.0	93.0
Female	07	7.0	100.0
Total	100	100.0	

Source: Primary data

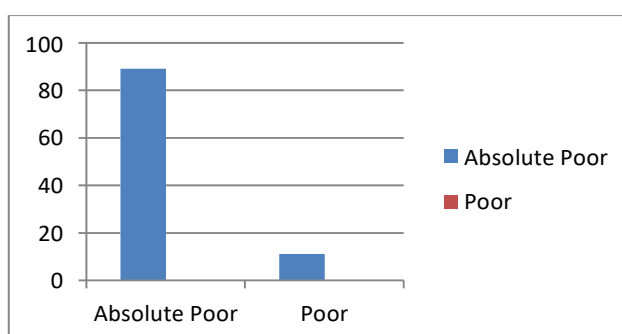


It is observed that 93 percent respondents are male and 7 percent are female

Table-5 ECONOMIC STATUS

Economic status	Frequency	Percent	Cumulative Percent
Absolute poor	89	89.0	89.0
Poor	11	11.0	100.0
Total	100	100.0	

Source: Primary data



It is observed that 89 percent of the farmers are from absolutely poor category and 11 percent from poor category.

Table-6 TYPES OF FORMERS

Type	Frequency	Percent	Cumulative Percent
Marginal farmers	94	94.0	94.0
Small farmers	6	6.0	100.0
Total	100	100.0	

Source: Primary data

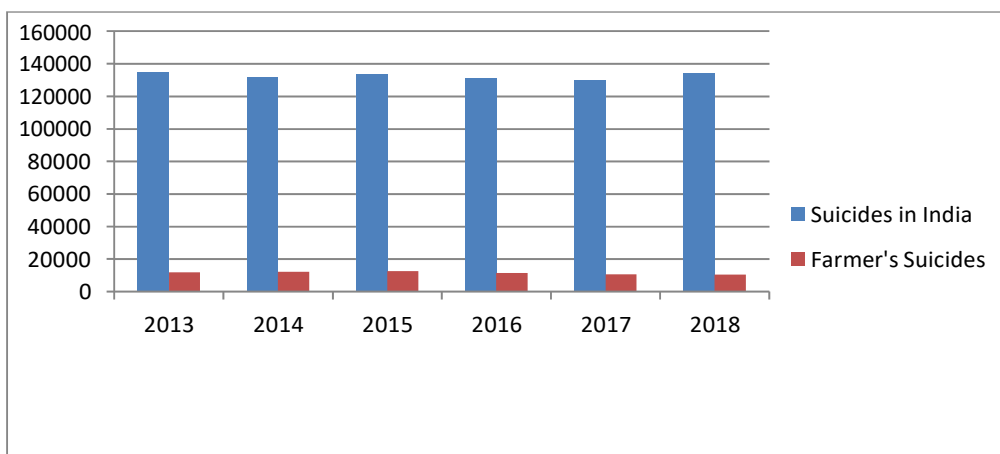
It is observed that 94 percent of farmers are marginal farmers and 6 percent are found as small farmers.

It is concluded that majority of the respondents, farmers, are drawn from poor families, marginal farmers and equipped with low level education.

Table-7 Trends in Farmers Suicides in India during 2013-2018

Year ⇨	2013	2014	2015	2016	2017	2018
Farmer's Suicides	11772	12360	12602	11379	10655	10349
Total Suicides	134799	131666	133623	131008	129887	134516
Percentage of Farmer's suicides	8.7	9.4	9.4	8.6	8.2	7.7

Source: The Registrar General of India and NCRB Report 2020, Govt. of India



It is observed that farmer's suicides in India are gradually reducing since 2016 year.

Table-8 Trends in Farmer's Suicides in Telangana State

Year →	2013	2014	2015	2016	2017	2018
Farmer's Suicides	2014	1400	1358	645	851	908

Source: The Registrar General of India and National Crime Records Bureau, Govt. of India

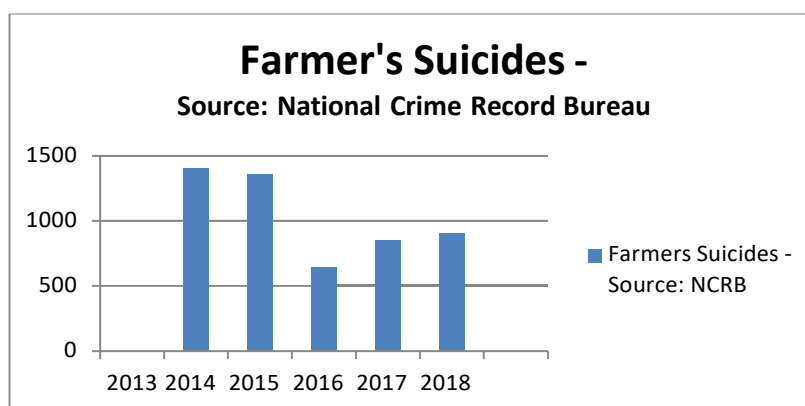
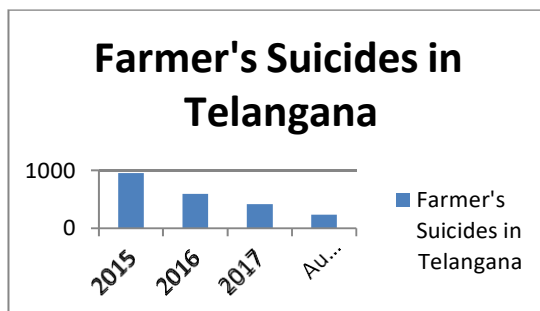


Table-9 Trends in Farmer's Suicides in Telangana State

Year ⇨	2015	2016	2017	Up to August 2018
Farmer's Suicides	948	593	417	232

Source: Suicides data from the Telanagangovernmennt's Police department in reply to a Right to Information request filed by Activist Kondal Reddy between 2014 (when the new state Telangana came into existence) and 2018.



It is concluded that farmer's suicides in Telangana State are gradually reducing during 2015 to 2018 as per the records of national crime Record Bureau and Police Department of Telangana Government.

STATEMENT OF DISTRICT WISE FARMERS SUICIDES IN TELANAGANA STATE

For the year 2015, 2016, 2017 and 2018

Source: Suicides data from the Telanagangovernmennt's Police department in reply to a Right

Sl. No.	Unit (District)	2015	2016	2017	Up to August 2018
1	Cyberabad	22	19	9	4
2	Hyderabad	--	--	--	--
3	Karimnagar	133	19	8	5
4	Khammam	62	33	27	19
5	Nizamabad	44	5	1	--
6	Rachakonda	--	40	36	13
7	Ramagundam	--	11	11	4
8	Siddipet	--	58	44	22
9	Warangal	130	58	33	24
10	Adilabad	31	23	15	16
11	BhadradiKothagudem	--	10	12	3
12	Jagitial	--	8	8	6
13	JayashankarBhupalapally	--	11	20	3
14	JogulambaGadwala	--	6	4	3
15	Kamareddy	--	5	6	4
16	KomurambheemAsifabad	--	4	--	--
17	Mahabubabad	--	13	3	9
18	Mahabub Nagar	208	30	24	9
19	Medak	119	26	8	2
20	Nagar Kurnool	--	46	27	10
21	Nalgonda	130	69	81	43
22	Nirmal	--	8	11	9
23	RajannaSiricilla	--	8	5	5
24	Sangareddy	--	10	1	1
25	Suryapet	--	5	8	3
26	Vikarabad	67	48	16	15
27	Wanaparthi	--	20	3	--
28	RP Sec-bad	2	--	1	--
Total		948	593	417	232

to Information request filed by Activist Kondal Reddy between 2014 (when the new state Telangana came into existence) and 2018.

IMPACT OF GOVERNMENT'S NEW INITIATIVES ON FARMERS SUICIDES

IN TELANGANA STATE

Results and Analysis:

Table-10 Impact of Central Government's Schemes

Schemes	Impact on reduction of farmer's Suicides (Percent)
---------	--

E-NAM	2.0
National Mission For Sustainable Development (NMSA)	--
Pradhan Mantri Krishi SinchaiYozana (PMKSY)	--
Paramparagat Krishi Vikas Yozana (PMKY)	--
Pradhan Mantri FasalBimaYozana (PMFBY)	2.0
Any other, specify (Minimum Support Prices)	10.0

Source: Primary Data 2019

It is observed that 10 percent of sample units felt that due to minimum support prices announced by central government, farmers suicides are reducing and followed by 2 percent sample units felt that there is a least effect of Electronic National Agriculture Marketing (E-NAM) system.

Table 11 Impact of Telangana Government's Schemes:

Schemes	Impact on reduction of farmer's Suicides (Percent)
RythuBandhu	61.0
Mission Kakatiya	32.0
Kalyan Laxmi/Shaaadi Mubarak	12.0
Aaasar Pension	5.0
House to Poor	2.0
Rythu Bheema	6.0
Sheep distribution	11.0
Any Other, Specify	--

Source: Primary Data 2019

It is observed that 61 percent of sample units felt that due to RythuBandhu initiated by Telanagana government, farmers suicides are gradually reducing as their Investment and Financial support increased with this program.

32 percent sample units felt that there is a decline in farmers suicides as they are getting confidence about irrigation facilities at least for a single crop with the implementation of Mission Kaktiya.

It is also observed that 12 percent and 11 percent of the sample units felt that Kalyanalaxmi and sheep distribution schemes are improving the farmer's economic status in the society and enhancing the financial support by the government without any agitations, respectively and

Rythju Bheema Program, Aasara Pension Scheme and House to Poor Programs are also have their positive impact on reduction of farmer's suicides in Telangana State.

MAJOR FINDINGS

AND

RECOMMENDATIONS

MAJOR FINDINGS AND RECOMMENDATIONS

An attempt is made in this chapter to present major findings and recommendations.

MAJOR FINDINGS

- Out of the 100 sample units, 25 percent are drawn from each district.
- It is observed that 55 percent of sample unit farmers are found in the age group of 31-50 years followed by 35 percent from the age range of up to 30 years and 10 percent respondents are found to be relatively elders.
- It is observed that 71 percent are just literates followed by 21 percent are equipped with up to school level education and 8 percent respondents with above school level education.
- It is observed that 93 percent respondents are male and 7 percent are female
- It is observed that 89 percent of the farmers are from absolutely poor category and 11 percent from poor category.
- It is observed that 94 percent of farmers are marginal farmers and 6 percent are found as small farmers.
- It is concluded that majority of the respondents, farmers, are drawn from poor families, marginal farmers and equipped with low level education.
- It is observed that farmer's suicides in India are gradually reducing since 2016 year.

- It is concluded that farmer's suicides in Telangana State are gradually reducing during 2015 to 2018 as per the records of national crime Record Bureau and Police Department of Telangana Government.
- It is observed that 10 percent of sample units felt that due to minimum support prices announced by central government, farmers suicides are reducing and followed by 2 percent sample units felt that there is a least effect of Electronic National Agriculture Marketing (E-NAM) system.
- It is observed that 61 percent of sample units felt that due to **RythuBandhu** initiated by Telangana government, farmers suicides are gradually reducing as their Investment and Financial support increased with this program.
- 32 percent sample units felt that there is a decline in farmers suicides as they are getting confidence about irrigation facilities at least for a single crop with the implementation of **Mission Kakatiya**.
- It is also observed that 12 percent and 11 percent of the sample units felt that **Kalyana Laxmi** and **sheep distribution** schemes are improving the farmer's economic status in the society and enhancing the financial support by the government without any agitations, respectively and
- **Rythu Bheema** Program, **Aasara Pension Scheme** and **House to Poor Programs** are also have their positive impact on reduction of farmer's suicides in Telangana State.
- The relationship between decreasing farmer's suicides and the Government new initiatives/ programs is found to be statistically dependent.
- The first hypothesis “. New agriculture development initiatives have directly influenced the agricultural production which is accompanied by a rise in real income of the farm families is accepted.
- The second hypothesis “There is an accountable effect of governments’ new programmes on decline of farmer suicides is accepted.

SUGGESTIONS AND RECOMMENDATIONS

On the basis of major findings, the following are made to achieve a significant reduction of farmers suicides in our state and they include.

1. One important request of victim households was to improve the access to regulated market and marketing facilities like storage facilities within their reach.

2. Construction and renovation of large tanks, check dams, watersheds, and completion of minor, medium and major irrigation projects as part of Kakatiya Mission has to be given top priority so as to ensure water availability and better water management by local irrigation committees around the state.
3. New marketing methods such as Contract farming, future marketing and training in food processing must be enhanced and made available to rural farmers.
4. One more suggestion of victim household was to establish more markets which facilitate direct relation between consumers and farmers such as Apni Mandi in Punjab and Haryana and Rythu Bazars in Telangana
5. There should be a timely sanction of financial support and benefits from the government as part of implementation of various schemes, such as **Rythubandhu** and **Rythu Bheema Yojana** and others.

CONCLUSION:

As per findings, the results are satisfactory and supported the hypotheses. Shortage of irrigation facilities, Failure of rain and attack of pest and disease leads to crop loss. These were reported as some of the causes for farmer suicides across states Maharashtra, Punjab, Haryana, West Bengal and Telanagana. Hence, there is a need to install weather stations and information centers so that farmers can be alert and informed on natural calamities and they can take precautionary measures. The Government of Telangana implemented **Mission Kakatiya** on 12 March 2015 and **mKISAN** Portal by the Department of Agriculture, Telanagana and the Government of Maharashtra launched the **Crop Pest Surveillance Project (CROPSAP)** during 2009-10. Further proper measures in implementation of the agriculture development programmes can help the farmers in suicide prone states.

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ANNEXURES

The major findings of the study

- The incidence of farmers suicides is around 20% among the beneficiary households of LWP while it is around 76% among non-beneficiary households.

- The incidence of suicides is higher among the beneficiary households of small land holders compared to large landholders. None of the large landholders who have accessed LWP has committed suicide.

- The rate of decline in the percentage of owner-cum-tenants is lower among beneficiary households of LWP as compared to non-beneficiary households. On the other hand, all the pure tenant non-beneficiary victim households have left agriculture.

- LWP has enabled highly distressed farmers to continue to allocate a higher proportion of cropped area under high value crops for their upward economic mobility.

- LWP has contributed to reduction in indebtedness as well as arrested the process of debt accumulation without compromising agricultural strategy for upward economic mobility.

- The number of owner-cum-tenants declined, while the number of owner families has increased.

- LWP has slowed down the rate of decline in operational land holding size.

- LWP has brought about a shift to high value crops in the cropping pattern.

- LWP has cleared debt of less distressed households with increased access to banks and reduced dependency on informal institutions for credit mobilisation.



Source : Farm loan waiver didn't stop suicides completely: CESS study, published in The Hindu, January 03, 2019

రైతు కుటుంబాలకు భరోసా 'రైతుబీమా'

నమోదైన రైతులు 31.86 లక్షల మంది
సర్కారు చెల్లించిన ప్రీమియం రూ.1,782.37 కోట్లు
రెండేండ్లలో 22,583 మంది రైతులు మృతి,
రూ.1,129.15 కోట్ల బీమా చెల్లింపు

హైదరాబాద్, నమస్తే తెలంగాణ: అన్నదాత కుటుంబాలకు రాష్ట్ర ప్రభుత్వం అమలు చేస్తున్న 'రైతుబీమా' పథకం భరోసా కల్పిస్తున్నది. నేలనే నమ్ముకొని ఆరుగాలం కిష్టపడి కుటుంబాన్ని పోషించే ఇంటి పెద్ద ఆకాల మరణంతో ఆ కుటుంబం భిన్నాభిన్నం కాకుండా ఉపయోగపడుతున్నది. రైతు కుటుంబాల వాస్తవ పరిస్థితులను ప్రత్యక్షంగా గమనించిన ముఖ్యమంత్రి కే చంద్రశేఖరరావు రైతుబీమా పథకానికి రూపకల్పన చేశారు. 2018 ఆగస్టు 14న ప్రారంభమైన ఈ పథకం.. దేశంలోని మిగతా రాష్ట్రాలను ఆలోచింపజేస్తున్నది. ఈ పథకం ప్రారంభమైన నాటినుంచి ఇప్పటి వరకు వివిధ కారణాలతో మరణించిన దాదాపు 22,583 మంది రైతుల కుటుంబాలకు బీమా సంస్థ రూ.1,129.15 కోట్లు పరిహారంగా చెల్లించింది. రైతుబీమా పథకానికి 18-59 ఏండ్లలోపు వయస్సు కలిగిన రైతు అను ఆర్హులుగా ప్రభుత్వం గుర్తించింది. వీరికి ప్రభుత్వమే బీమా ప్రీమియాన్ని చెల్లించింది. బీమా పథకం కింద నమోదైన రైతులు ఏదైనా కారణంతో మరణిస్తే వారి కుటుంబసభ్యులకు 10 లక్షల రూ.5 లక్షలు పరిహారంగా



మైన తొలి ఏడాది 2018-19లో 31.86 లక్షల మంది రైతులు వీర్లు నమోదు చేసుకొన్నారు. వీరికి ఒక్కొక్కరికి రూ.2,271.50 చొప్పున ప్రభుత్వం దాదాపు రూ.710.58 కోట్లు ప్రీమియంగా చెల్లించింది. తొలి ఏడాదిలో దాదాపు 17,399 మంది రైతులు వివిధ కారణాలతో మృత్యుచెందగా.. వీరి కుటుంబాలకు రూ.5 లక్షల చొప్పున దాదాపు రూ. 869.95 కోట్లు బీమా కంపెనీ చెల్లించింది. 2019-20లో కూడా ఒక్క రైతుకు రూ.3,457.40 చొప్పున ప్రీమియంగా దాదాపు 31.86 లక్షల మంది రైతులకు గ్రూప్ గా రూ.1,071.79 కోట్లు ప్రభుత్వం చెల్లించింది. ఈ ఏడాదిలో ఇప్పటి వరకు 5,184 మంది రైతులు వివిధ కారణాలతో మరణించినట్లు వ్యవసాయాధికారులు గుర్తించారు. మరణించిన రైతుల కుటుంబాలకు దాదాపు రూ.259.20 కోట్లు చెల్లించినట్లు ఎల్ఐఎస్ అధికారులు వెల్లడించారు. రైతుబీమా పథకం కింద నమోదైన రైతుల్లో సుమారు 91 శాతం మంది చిన్న, సన్నకారు రైతులే ఉన్నారు. 88 శాతం ఎస్సీ, ఎస్టీ, బీసీ, మైనార్టీలకు చెందిన కుటుంబాలు ఉన్నాయి. రైతుల నమోదు ప్రక్రియగా ఇప్పటికీ కొనసాగుతున్నది. 13.01.2020

రెండేండ్లలో నమోదైన, మరణించిన రైతుల వివరాలు

జిల్లా	రైతుల నమోదు	మరణించినవారి సంఖ్య		
		2018-19	2019-20	మొత్తం
అదిలాబాద్	84,716	550	168	718
బుధాద్రి కొత్తగూడెం	73,931	418	133	551
జగిత్యాల	1,02,888	584	189	753
ప్రొ.జి. యాపాలవల్లి	58,368	228	81	307
జోగుకొండ గద్వాల	31,960	492	154	646
కామారెడ్డి	1,35,593	788	214	982
కరీంనగర్	95,718	359	180	489
ఖమ్మం	1,64,336	802	248	1050
కుటుంబం ఆసిఫాబాద్	54,517	363	128	489
మహబూబాబాద్	1,03,029	441	131	572
మహబూబ్ నగర్	1,00,707	677	179	856
మంచిర్యాల	66,644	337	103	440
మెదక్	1,14,384	694	215	909
మేడ్చల్ మర్చాజిగిరి	13,078	68	32	100
ములుగు	31,188	144	27	171
నాగర్ కర్నూల్	1,41,805	736	244	980
నల్గొండ	2,21,967	1289	341	1630
నారాయణపేట్	85,490	627	187	794
నిర్మల్	89,694	535	159	694
నిజామాబాద్	1,35,901	694	214	908
పెద్దపల్లి	71,576	310	108	418
రాజన్న సిరిసిల్ల	63,766	312	86	398
రంగారెడ్డి	1,36,697	827	219	1046
సంగారెడ్డి	1,47,776	1048	321	1369
సిద్దిపేట	1,44,228	754	202	956
సూర్యాపేట	1,28,819	605	200	805
వికారాబాద్	1,06,090	752	168	920
వనపర్తి	83,737	466	158	624
వరంగల్ (అర్బన్)	52,676	243	67	310
వరంగల్ (రూరల్)	1,05,536	377	127	504
యాదాద్రి భువనగిరి	96,611	551	172	723
మొత్తం	31,77,647	17,399	5,184	22,583



TELANGANA

District

Zone

SUN



తెలంగాణలో తక్కువగా ఉండటం గమనార్హం. ఆర్థిక నేరాలు ఆదుపు లోకి రావడంలేదు. 2018 సంవత్సరంలో దేశంలో జరిగిన నేరాలకు సంబంధించి జాతీయ నేరాల నమోదు సంస్థ (ఎన్.సి.ఆర్.బి.) రూపొందించిన నివేదిక గుర్తువారం విడుదల చేసింది. 2017తో పోల్చు కుంటే రాష్ట్రంలో నేరాలు స్వల్పంగా తగ్గినట్లు వెల్లడించింది.

నమోదు సంస్థ విడుదల చేసిన 2018 గణాంకాల ప్రకారం రిమాండ్ ఖైదీలు, శిక్షపత్ర వారికి కలిపి వేల సంఖ్యలో విద్యాబోధన చేశారు. ముంది వివిధ చేతిపుట్టుల్లో శిక్షణ పొందారు. ఖైదీలకు వృత్తివిద్య ఉండతో గుజరాత్ (5545) తర్వాత స్థానం తెలంగాణదే. ఇక్కడి ఖైదీ రికార్డు స్థాయిలో రూ. 206.405 కోట్ల విలువైన వస్తువులు ఉత్పత్తి చేశారు. దేశవ్యాప్తంగా రాష్ట్ర, జాతీయ మానవహక్కుల సంస్థల ను సదుపాయాలు, ఇతరత్రా 841 ఏర్పాదులు రాగా తెలంగాణ జైళ్లకా ఒక్కటి రాకపోవడం గమనార్హం. దేశంలో సగటున 100 మందికి ముంది ఉంటున్నట్లు తేలింది. తెలంగాణలో 100 మందికి 77.1 మ ఉన్నట్లు నివేదిక వెల్లడించి. రాష్ట్రంలోని ఆస్తి జైళ్లలో 7195 మంది లను ఉంచడానికి వసతులు సమకూర్చగా 2018లో 5550 మంది మాత్రమే ఉన్నారు. అక్షరాస్యత విషయంలోనూ మన జైళ్లు ముందు న్నాయి. వీటి చేసిన వారు 109, డిగ్రీ చేసిన వారు 535 మంది ఉ

రైతు ఆత్మహత్యల్లో మూఢాల్లుగు స్థానాల్లో తెలుగు రాష్ట్రాలు

- 2018లో దేశవ్యాప్తంగా
- 10,349 మంది అన్నదాతల బలవన్మరణం
- వీరిలో 4586 మంది వ్యవసాయ కూలీలు
- ఎన్.సి.ఆర్.బి నివేదికలో వెల్లడి



దేశవ్యాప్తంగా 2018లో 10,349 మంది అన్నదాతలు ఆత్మహత్యకు పాల్పడ్డారు. రైతు ఆత్మహత్యల్లో తెలుగు రాష్ట్రాలు మొదటి ఐదు స్థానాల్లో ఉన్నాయి. అత్యధికంగా అన్నదాతలు బలవన్మరణాలకు పాల్పడిన రాష్ట్రాల్లో మొదటి రెండు స్థానాల్లో వరుసగా మహారాష్ట్ర, కర్ణాటకలు ఉండగా మూడు, తెలంగాణ, నాలుగు ఆంధ్రప్రదేశ్. ఆయిడ్స్థానంలో మధ్యప్రదేశ్ ఉంది. 2018లో ఆత్మహత్యలకు సంబంధించిన నివేదికను జాతీయ నేరాల నమోదు సంస్థ (ఎన్.సి.ఆర్.బి.) విడుదల చేసింది. తెలంగాణలో రైతులు అధిక సంఖ్యలో ఆత్మహత్య చేసుకోగా, ఏపీలో రైతులు, వ్యవసాయ కూలీలు ఉన్నారు. పశ్చిమబెం

ఎన్.సి.ఆర్.బి నివేదికలో వెల్లడైన అంశాలు..

2018లో ఆత్మహత్యకు పాల్పడిన రైతులు 10349

వీరిలో రైతులు, రైలుదారులు వ్యవసాయ కూలీలు
5763 (306) 4586 (515)

తెలంగాణలో ఆత్మహత్యకు పాల్పడినవారు 908

ఇందులో రైతులు	కొలు దారులు	వ్యవసాయ కూలీలు
720 (83)	180 (24)	8

ఆంధ్రప్రదేశ్ లో ఆత్మహత్యకు పాల్పడినవారు 664

ఇందులో రైతులు	కొలు దారులు	వ్యవసాయ కూలీలు
199 (13)	166 (12)	299 (46)

ద్రాక్షిల్లో ఉన్నది మహిళా రైతులు, మహిళా కూలీల సంఖ్య

గాల్, బీహార్, ఒడిశా, ఉత్తరాఖండ్ లో ఒక్క రైతు కూడా ఆత్మహత్య చేసుకోలేదని నివేదిక వెల్లడించింది. ఆత్మహత్య చేసుకొన్న రైతులు, వ్యవసాయ కూలీల్లో సగం మందికిపైగా మహారాష్ట్ర, కర్ణాటకలోనే ఉన్నారు.

u epaper



Duradcor

Beauty that enhances



10-Jan-20 | Page 11













TENANT FARMERS

THERE ARE OVER 25 LAKH TENANT FARMERS IN AP. OUT OF THEM, ONLY 1,40,000 COULD GET BANK LOANS

- 1995-2013 was the worst period for farmers in united AP as over 38,000 farmers ended their lives
- According to National Sample Survey, each farmer in AP has a debt of ₹1.25L on his head
- Understanding the plight of the tenant farmers, government has started giving identity cards to tenant farmers and in Andhra Pradesh, as many as five lakh ryots were issued ID cards

6 The loan waiver amount first gets deposited in owners' accounts but they do not pass it to tenants

P. PULLA RAO, agriculture minister

SOB STORY

Telangana's suicide rate way ahead of national average of **10.6 %**

1,347
farmer suicides reported in 2014

2,954
women committed suicide

This gives Telangana second place in farmer suicides in the country

Driving factors: Debt, fall in social status, prolonged illness, marital and family discord, poverty and professional problems



TRAGEDY WITHOUT END

*Total number of farmer suicides in	2014 2,115	2015 2,997	2016 (Jan-Mar) 116
Maharashtra	1,207	1,841	57 (till Feb 29)
Telangana	503	342	3 (till Mar 11)
Karnataka	156	107	-
Madhya Pradesh	120	-	-
Andhra Pradesh	78	-	-
Punjab	3	495	56 (till Mar 11)
Odisha	-	139	-

*Farmers and farm labourers
Source: Union ministry of agriculture and farmers' welfare

Union Minister of Agriculture, Radha Mohan Singh, in his reply to a question in the Rajya Sabha on Tuesday, said that the farmer suicides in India have taken a dip in 2016, as compared to the years 2015 and 2014. Continuing the UPA-era tradition of recording the suicides of farmers and agricultural workers separately, the government has tried to portray that the number of farmers' suicides has decreased. But the distress of rural India appears to have become even more severe, with increasing number of suicides of agricultural workers.

An analysis of the data shows that farmers' suicides have decreased by 20 per cent; the number has gone down from 12,602 (8,007 farmers and 4,595 agricultural workers) in 2015, to 11,370 (6,351 farmers and 5,019 agricultural workers) in 2016. In 2014, the country saw 12,360 suicides (6,710 agricultural workers and 5,650 farmers). Agricultural workers' suicides have gone up in all many states this year – including Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, and Telangana.

SUICIDE COUNT				
	FARMER		FARMER LABOUR	
STATES	2016	2015	2016	2015
MAHARASHTRA	2,550	3,030	1,111	1,261
KARNATAKA	1,212	1,197	867	372
TELANGANA	632	1,358	-	-
MADHYA PRADESH	599	581	722	709
CHATTISGARH	585	854	-	-
ANDHRA PRADESH	239	516	565	400
PUNJAB	222	100	-	-
ALL INDIA	6,351	8,007	5,019	4,595

The provisional data of suicides in the farming sector by the National Crime Records Bureau states that Maharashtra still remains the state with the highest number of suicides. Out of the recorded 3,661 suicides in 2016, the state witnessed suicides of 2,550 farmers and 1,111 agricultural workers. The crisis appears to be equally dire in southern states – Karnataka, Andhra Pradesh, and Telangana. Karnataka, despite the existence of various farmer welfare schemes, continues to be graveyard for distressed and indebted farmers. The state witnessed suicides of 2,079 persons, out of which 1,212 were farmers.

The data might be a cause of discomfort for MP CM Shivraj Singh Chauhan, who had claimed to have removed Madhya Pradesh from the infamous group of 'BIMARU' states. MP still continues to be the state with the third-highest number of farmers' suicides. It shows an utter failure of the farm loan waiver scheme after Mandsaur shootings – which had claimed lives of seven farmers last year. The state recorded suicides of 722 agriculture workers and 599 farmers.

Andhra Pradesh and Telangana present a similar picture. While Andhra Pradesh saw 804 farm sector-related suicides, Telangana recorded 645 personstaking their own lives.

Talking to *Newslick*, VijooKrishanan, Joint Secretary of All India Kisan Sabha, said that the bifurcation of suicidees into agricultural workers and farmers is intended to show that farmers are not being affected. But the crisis continues to revolve around the agrarian sector.

"In Telangana and Andhra Pradesh, we see a huge force of 26 Lakh agricultural workers who are also tenant farmers. Their status as tenant farmers does not mean they should not be counted as farmers. They are prone to the worst forms of exploitation," he said.

Commenting on the failure of the farm loan waivers, Krishnan added that they have only addressed those farmers who have taken loans from institutional sources like banks and co-operatives, but majority of the farmers are still dependent on money lenders.

He said, "After our struggle, we saw the formation of Debt Relief Commission in Kerala which is mandated to look into the loans taken from informal sector too."

In Telangana, depressed farmers get counselling on phone

[Himanshi Dhawan, In Telangana, depressed farmers can phone a friend, April 21, 2019: *The Times of India*](#)

The Kisan Mitra helpline is saving farmers' lives with both online counselling and offline support

Revathi Goli from Kowtha village in Telangana's Adilabad district was sobbing when she called the Kisan Mitra helpline in February this year. Deep in debt, she and her husband Gangaiah were about to commit suicide. "Can you help?" she asked in despair.

The family had a bank loan of Rs 40,000 pending, and was recently told they were ineligible for the PM Kisan Samman Nidhi Yojana's cash grant of Rs 6,000. Another Rs 12,000, promised by the state government to small farmers like themselves, didn't come through either despite several visits to the district office last year. As pressure from the bank increased, Revathi felt cornered. "We have no money to eat, let alone pay the bank," she told Sreeharsha T, a coordinator at Kisan Mitra. He calmed her down and assured her that they would find a solution.

Soon a field coordinator was at their home to talk to them. The funds for both schemes were stuck in the district office but after Kisan Mitra members flagged off the issue with the authorities, things picked up pace. Revathi's call is just one among more than 8,000 that this helpline has received from distressed farmers since 2017. Run by NGO Centre for Sustainable Agriculture (CSA), calls to the helpline doubled from 2,617 in 2017 to 5,516 in 2018. And this is only from three Telangana districts where the helpline is operational. Though NCRB data on farmer suicides has not been updated since 2015, Telangana has the highest number of suicides after Maharashtra.

CSA executive director G V Ramanjaneyulu says the farm crisis is increasing because there is a systemic failure on the part of the government in addressing these problems. Even basic things like land ownership are often under doubt because of poor land record management. "Knee-jerk decisions like loan waivers benefit land owners rather than the farm labourer," he adds.

Unlike helplines run in Maharashtra and Punjab, Kisan Mitra combines counselling with field coordinators. The helpline is manned by all-women team of six-seven counsellors. They are assisted by field workers who conduct meetings, hold workshops, scour hospitals for suicide cases and keep an eye on moneylenders as they work to relieve farmer distress. The team has also worked with Pesticide Action Network (PAN) and trained doctors to learn the treatment protocol as poisoning by pesticide is a common method of suicide.

In June last year, 40 farmers led by AnantaihBadempally from Buklapur village, Vikarabad district threatened to commit mass suicide. Each was owed Rs 22 lakh to Rs 40 lakh in payments for the sale of the red gram crop which had been delayed by four months. Some had sick family members to tend to, while others had moneylenders on their back. "Help us or we will drink pesticide," they cried on the phone. Payments were finally facilitated to them within a couple of days once the NGO members stepped in.

When Malappa Tandra from Vikarabad district called the helpline, he was angry and drunk. The farmer, who had inherited a debt of Rs 1 lakh from his father, was in dire straits after his sugarcane crop failed because of inadequate water. The family was also dealing with health issues — Malappa's mother had had her kidney removed, while both his daughters suffered from disabilities. His efforts to get a loan for drip irrigation had just failed when he called the helpline from outside a local liquor shop. As the counsellor calmed him down and bought time, a field

worker reached him and took him home. The NGO helped him get a loan and medical assistance with the help of local authorities. Kavitha Kuruganti from NGO Alliance for Sustainable and Holistic Agriculture (ASHA) says Kisan Mitra has proved that a preventive approach is possible. “The helpline is not just a call centre answered by a disinterested voice. It has field workers reaching out to the distressed family to provide offline support also,” she says, advocating the need for an institutional response to the crisis by the government.

PLUGGED IN: Farmers, facing problems like crop failure, access to loans and medical assistance call the helpline

Calls to Kisan Mitra have doubled from 2,617 in 2017 to 5,516 in 2018 from just three Telangana districts

Times of India:

In what can be considered a major victory for the State government, according to data available with it, there have been no suicides in Telangana since June 2018. Telangana once had the dubious distinction of reporting the highest number of farmer suicides in the country along with the Vidarbha region in Maharashtra. While the situation has not gotten any better in Vidarbha, there has been a large improvement in Telangana over the past seven months, thanks to the RythuBandhu investment support programme announced here in May 2018.

Speaking to Express, Chief Secretary SK Joshi said, “Since June 2018, as per our information, no farmers has committed suicide.” Union Agriculture Minister Radha Mohan Singh had recently quoted National Crime Records Bureau statistics in the Parliament that compared to 2015, when there were 1,354 suicides in the farming sector, in 2016 the number dropped to 632.

While the State government has said that there is no data available for 2017, it claims the number of suicides had come down by a large magnitude in the first half for 2018, even before RythuBandhu was announced.

According to officials, from January to June 2018, around 30 suicides had been reported in the State. From June, however, the number of suicides has stopped. The reasons for the steep decline in the farmers’ suicides in Telangana include RythuBandhu, 24X7 uninterrupted power supply, waiver of crop loans to the tune of `17,000 crore in 2014 and also the introduction of Rythu Bhima, a `5 lakh insurance coverage scheme for farmers. The State government disbursed `8,000 per acre under RythuBandhu in two instalments for Kharif and Rabi of 2018. The amount will be increased to `10,000 per acre from the next financial year. These pro-farmer measures adopted by the TRS government yielded the desired results, the officials pointed out.

“When compared to neighbouring Vidarbha region in Maharashtra, the farmers’ suicides have declined in Telangana,” the officials further said. In 2018, more than 1,200 suicides of farmers were reported in Vidarbha alone.

RythuSwarajya Vedika secretary B Kondal Reddy said that the number of farmers suicides had indeed come down in Telangana.

“On an average, around fifty suicides are being reported in the State currently. However, 80 to 90 per cent of the victims are tenant farmers,” Reddy added. He further demanded that even

if the farmer's family got an insurance coverage of `5 lakh, the same compensation should be given to the kin of the farmer who committed suicide as well.

SAMPLE QUESTIONNAIRE

QUESTIONAIRE

‘Impact of new initiatives on farmers suicides in Telangana State’

DATA COLLECTION FOR “A TARA COLLEGE STUDENT’S PROJECT”

Dear Respondents,

Greetings!

Please go through the following questionnaire and respond to the questions contained in it. Please do not hesitate to ask questions in case you do not understand questions. Reflect on questions before answering them.

This questionnaire consists of three parts, the first part is meant to glean general data and the rest of the two parts focus on extracting responses regarding the main theme of the research topic. We assure you that these data are collected only to examine the effects of government new initiatives on farmer’s suicides in our state. We also affirm that these data collected will be utilized only for the purpose of the study and nothing else. We also entreat you to be objective in choosing your responses. If you refuse to respond to any questions, you are free to do so. If you think you could suggest anything regarding the questionnaire, please find the space at the end of the it.

PART – A

GENERAL DATA OF THE RESPONDENT

1. Name of the respondent.....

2. Relation with Victim

Wife: ☐ Son/Daughter ☐ Father ☐ Mother ☐ Relative/Friend ☐

Age: 20- 25 years ☐ 25- 30 years ☐ 30- 35 years ☐ 35- 40 years ☐ Other ☐

3. Sex: Male ☐ Female ☐

4. Mother Tongue: Telugu ☐ Urdu ☐ Other ☐

5. Details of Deprived Person/Farmer:

a. Sex: Male ☐ Female ☐

b. Age: Up to 30 years ☐ 31- 50 years ☐ Above 40 years ☐ Other ☐

c. Education: Illiterate ☐ Up to School level ☐ Above School level ☐

6. I hail from: Rural area ☐ Semi-urban ☐ Urban ☐

7. Economic Status: Absolute Poverty ☐ Poor ☐

8. Type of farmer: Marginal Farmer ☐ Small Farmer ☐

PART – B

Given below are the questions to elicit objective responses from you. Please feel relaxed and free to respond. We assure you that your responses will not be shared to anyone. Your collective responses will form part of data which helps to know about major Socio-Economic issue of the country i.e., Farmer's suicides.

1. 7. Socioeconomic characteristics of victim: SC ☐ ST ☐ BC ☐ General/Other ☐

2. 8. Details of : AAY ☐ BPL ☐ APL ☐ Nil ☐

3. 9. Marital Status of victim : Married ☐ Un-married ☐

4. 10. Causes of victim :

I. Social Causes of victim : Illness ☐ family quarrel ☐ Children marriage ☐

a. Extra-marital affairs ☐ divorce ☐ others ☐

II. Farming Causes : Lack of access to expected credit ☐ failure of rain ☐

failure of crop ☐ others ☐

III. Economical/Financial Causes: Indebtedness ☐ Recovery pressure ☐

Fall in social reputation ☐ Social functions (Marriage, etc.) ☐

5. Impact of suicide on the family: No earning member reputation ☐

Insecurity in the family reputation ☐

Members under depression reputation ☐

Discontinuation of Agri. Activities reputation ☐

Illness among family members reputation ☐

Postponement of children Education/ Marriage ☐

6. Reasons for reducing Suicides:

A. Social Causes :

1. Children marriage – Kalyana Lakshmi (Shadimubharak).....
2. Illness- Health Insurance scheme.....
3. Family- No need to quarrel
4. Others ,If any

B. Financial Causes :

1. More Availability of Crop Loans
2. Crop Insurance Schemes
3. Kisan Credit Card Scheme and Others

C. Govt. New Programmes:

1. Central Government Schemes:

- a. E-NAM.....
- b. National Mission For Sustainable Development (NMSA).....
- c. Pradhan Mantri Krishi SinchaiYozana (PMKSY).
- d. Paramparagat Krishi Vikas Yozana (PKVY).....
- e. Pradhan Mantri FasalBimaYozana (PFBY).....
- f. Others , specify.....

2. Telangana State Schemes:

- a. RythuBandhu Scheme
- b. Mission Kakatiya.....

- c. Kalyana Lakshmi / Shaadi Mubarak.....
- d. Asara Pension scheme.....
- e. Housing for the Poor.....
- f. Sheep
distribution.....
- g. RythuBimaYozana.....
- h. Any other, specify.....

Name of the student:

Class, year and Group :

Signature

CERTIFICATES OF PARTICIPATION:




Government of Telangana
Commissionerate of Collegiate Education



Certificate of Participation

This certificate is awarded to DY-6. JAGADISHWAR
Asst/Assoc. Professor Economics GDC TARA GOVT.
COLLEGE (A), SANGAREDDY in recognition of his/her participation as
Teacher Mentor in Jignasa-Student Study Projects-State Level Presentation &
Selection in the subject Economics for the academic year 2019-20.


Academic Guidance Officer


Commissioner of Collegiate Education

Sponsored by State Project Directorate, RLISA



DEPARTMENT OF PHYSICS:

Jignasa 2019

Subject :Physics

College: Tara Govt College(A) Sangareddy

Class:B.Sc. (M.P.Cs) I Year (2019-20)

By
Ch.Shiva Kumar
A. Suyog
S.Jashanth
N.Jagadishwar
B. Krishna

THERMISTOR BASED SAFE COOKING ALARM

Mentor: V.Satya Prakash, Asst Prof of Physics, Tara Govt College(A), Sangareddy-502001

Abstract:

Thermistor Based Safe Cooking Alarm

Introduction:

When some vessel is placed on the gas stove to boil some liquid like milk or to cook some food, after the liquid inside of it is boiled, it fills the entire vessel and spills over the edges of the vessel. If unwatched, this spilled over liquid may put off the flame of the stove, allowing the gas to leak out from the cylinder. This may be too dangerous for any house hold. If there is any arrangement of giving the information of spillage within the short span of its starting, people around the kitchen may get alerted to reduce the flame or switch off the stove. This can be achieved by constructing the thermistor based alarm. This is constructed by using an operational amplifier. When a hot liquid just touches the thermistor in the input circuit, current flowing through the op-amp makes the alarm on the output-side ring. This alerts the people around the kitchen. Then they may reduce the flame or switch off the stove to avoid the spillage and subsequent leakage of gas from the cylinder. This makes the kitchen very safe and cooking very smooth.

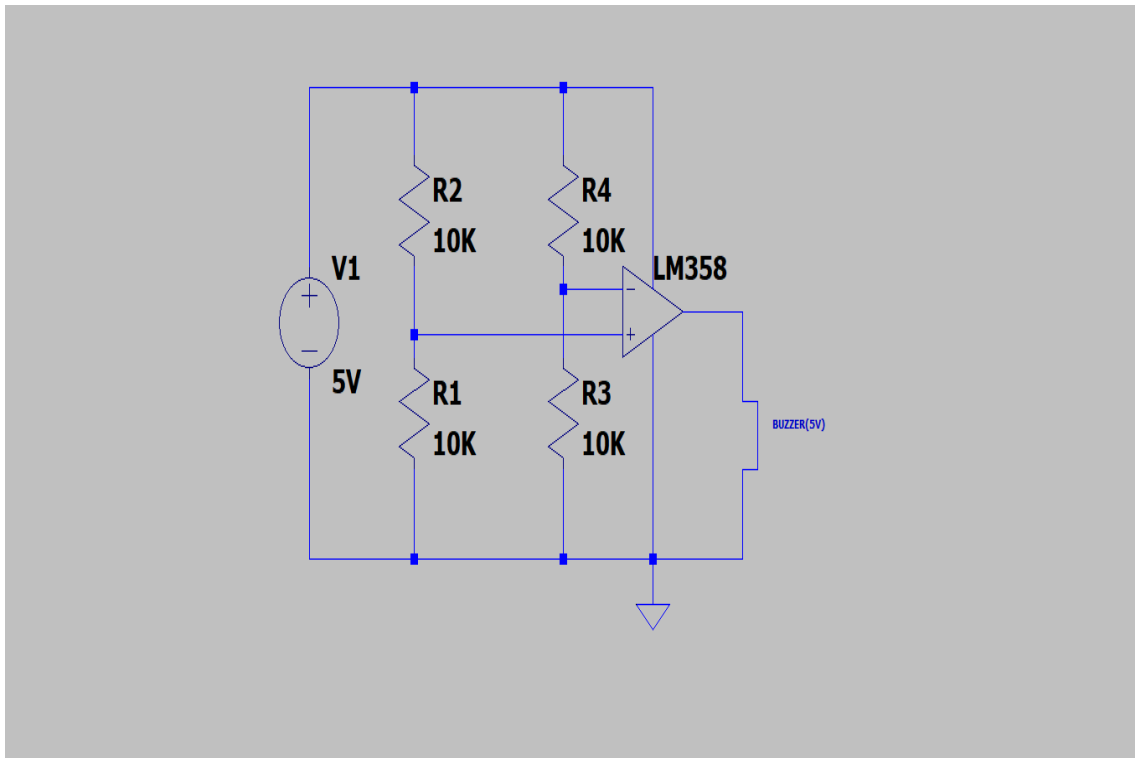
Components:The following components are used to construct the thermistor-based kitchen alarm:

- (1) Battery (5V)
- (2) Resistor R_1 (10k Ω)
- (3) Thermistor R_2 (10k)
- (4) Resistor R_3 (10k Ω)
- (5) Resistor R_4 (10k Ω)
- (6) Op-amp (LM 358):
- (7) Buzzer (5V)
- (8) Bread Board:
- (9) Connecting wires

Principle:

The resistance of a thermistor varies very fast and precise manner proportionately with the change in the temperature. So it can be used as the temperature sensor by observing the change in resistance or current in the circuit of the thermistor.

Circuit Diagram:



Construction and Working:

Kitchen alarm circuit is basically an Op-amp circuit in which Op-amp LM358 is working as a comparator. The voltage divider arrangement is connected to each input of the Op-amp. The non-inverting input of the Op-amp is connected to a voltage divider arrangement made up of a 10K thermistor R_2 and a $10k\Omega$ resistor R_1 . The inverting input is connected to a voltage divider arrangement made up of the resistors R_3 and R_4 each of resistance $10k\Omega$. The battery (5V) is connected to the outer ends of resistor R_1 and thermistor R_2 .

As the hot liquid spill over the thermistor R_2 , the temperature of the thermistor rises immediately. As a consequence of this, the resistance of the thermistor decreases and voltage across non inverting input increases compared to the voltage across the inverting input. Since this op-amp is working as comparator, the output of Op-amp goes high and the buzzer connected to the output of the Op-amp goes on beeping.

This beeping of alarm connected to the stove alerts the people around the kitchen to control the flame of the stove. They may either reduce the flame or switch-off the stove to avoid the gas leakage from the stove.

Conclusions:

The thermistor based safe cook alarm (kitchen alarm) is a safe and inexpensive device to keep the kitchen safe and avoid any subsequent damage. The functionality of the device can be further extended by using microcontrollers and micro motors. Then this kitchen alarm will automatically either reduce the flame or switch off the stove without any human intervention.

References:

- (1) Electronic Principles, 7th Edition, Albert Malvino and David J Bates, McGraw-Hill Companies, New Delhi.
- (2) Modern electricity/electronics, Miller Gary M., Prentice-Hall, Inc., N.J.
- (3) <https://www.instructables.com/>

JIGNASA

Student Study Project – 2022

Objective: Student
Study Project

Date: 15 February 2022

No of students participated: 05

The department of physics under the guidance of Sri P R Ratan Kumar has conducted Student Study Project: Jignasa - 2022 with Five students from B.Sc. MPCs III year on Conservation of Energy using Sensors. The students have demonstrated conservation of energy using Photo sensors and motion sensors and thermal sensors.

YouTube Link: <https://youtu.be/co4frWpnOKY>



The following students have participated in this project.

P R Ratan Kumar	Mentor	Head & Assistant Professor
B Krishna	Student	BSc MPCs III year
B Umarani	Student	BSc MPCs III year
A Suyog	Student	BSc MPCs III year
S Jashanth	Student	BSc MPCs III year
S Rahul	Student	BSc MPCs III year

MICROBIOLOGY:

**Evaluating the Antimicrobial Activity of Hand Sanitizers
against Bacterial and Fungal Pathogens.**

Jignasa Student Study Project 2021-22

To



**Commissioner ate of Collegiate Education
Telangana State**



By

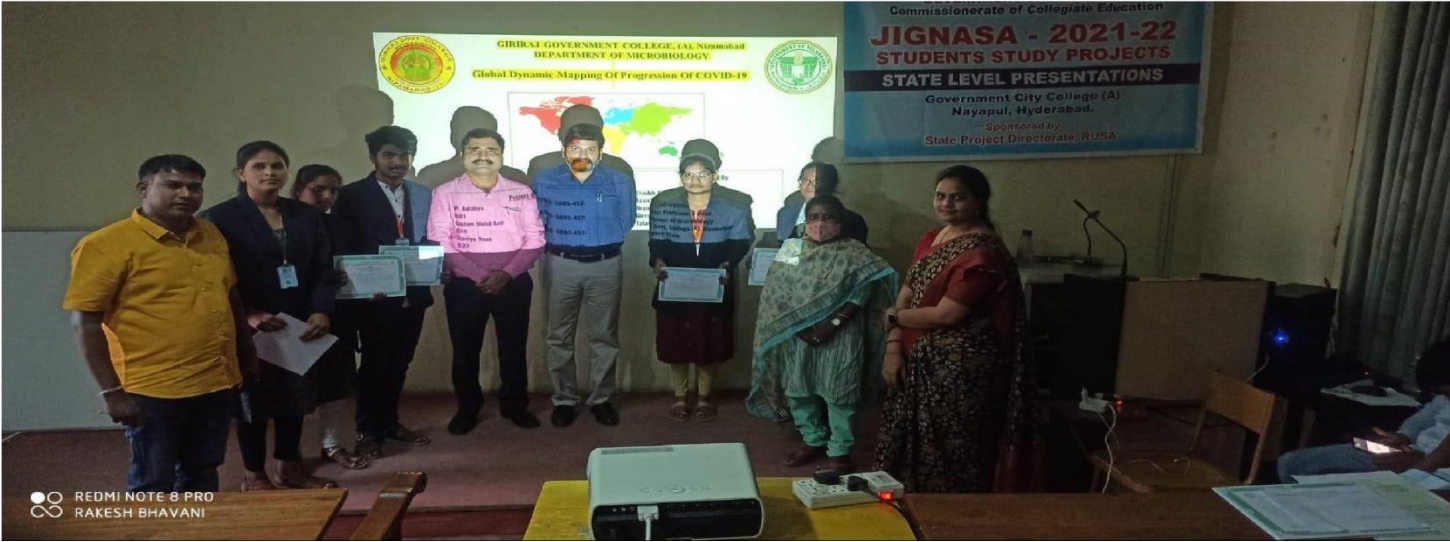
Department of Microbiology

**TARA Government Degree& PG (A) College
Sangareddy.**

ABSTRACT

The emergence of the novel virus, SARS-CoV-2, has posed unprecedented challenges to public health around the world. Currently, strategies to deal with COVID-19 are purely supportive and preventative primarily aimed at reducing transmission, Secondly by immune prophylactic measures like Vaccination. An effective and simple method for reducing transmission of infections in public or healthcare settings is hand hygiene. Little is known regarding the efficacy of hand sanitizers against SARS-CoV-2. To evaluate the antimicrobial efficacy of four different hand sanitizers against three Bacterial strains namely ATCC strain - *E.coli* 25922, ATCC strain -*Staphylococcus aureus* 25923 *Klebsiella pneumonia* and Two Fungal strains *Candida albicans*, *Aspergillus niger* as well as to assess and compare the antimicrobial effectiveness among four different hand sanitizers. The present study is an in vitro study to evaluate antimicrobial efficacy of Dettol, Lifebuoy, Himalaya and one Herbal hand sanitizers prepared in the lab against clinical isolates of the above mentioned test organisms. The agar disk method and agar diffusion test using Mueller-Hinton agar was used for bacteria Sabourads agar for Fungi to evaluate the antimicrobial efficacy of hand sanitizers. Discs were prepared with Whatman filter paper No. 1 in size of about 6 mm in diameter, Blank discs were sterilized by dry heat method (Hot air oven). Sterile cotton swab dipped into each culture tube containing inoculum broth of exponential growth phase and excess removed by rotating firmly against inside wall of the tube above the liquid level. Swab was streaked over agar surface three times while rotating the agar plate at an angle of 60° after each application. In diffusion method Sterile 6 mm cork borer used to prepare 4 equally spaced holes in agar plate and fifty micro liters of the each hand sanitizer was introduced into each of the 4 wells. In the disc method another set of agar plates inoculated with culture were placed with Discs soaked in Sanitizer. This was done for all the test organisms and plates were incubated in an incubator for 24 h at 37°C. The standard antibiotic discs used are Penicillin for *Staphylococcus aureus*, Tetracycline for *E.coli*, Tetracycline for *Klebsiella pneumonia* were supplied by HiMedia. Analysis of zone of inhibition to evaluate Antimicrobial efficacy of different hand sanitizers indicating susceptibility of the respective test organism. Maximum zone of inhibition (in mm) was observed in Disc diffusion method compared to diffusion method. Maximum inhibition of growth for *Klebsiella pneumonia* observed was 8.8, 6.8 (in mm) respectively for the Herbal Sanitizer with reference to the control Tetracycline. Minimum growth inhibition was observed with commercially available sanitizers

Himalaya, Lifebouy, Dettol. For the E.coli also Herbal Sanitizer showed maximum growth of inhibition 8.2,8.0 (In mm) with reference to the control. For Staphylococcus aureus maximum growth inhibition was observed with 7.4, 6.3 in mm Herbal Sanitizer compared to the Himalaya, Lifebuoy, Dettol respectively. The zone of inhibition observed for *Candida albicans* was 2.0 for both Herbal and Dettol sanitizers 1.9. For the *Aspergillus niger* the zone of inhibition was Dettol 2.3, Herbal 2.1, Lifebuoy 1.9, Himalaya 1.8 respectively. The effectiveness of hand sanitizers in terms of zone of inhibition was highest against bacteria compared to fungi.The present study has its own limitations – as only the antimicrobial efficacy of Four different hand sanitizers was assessed. Further studies are required to assess the exact quantity and duration of application of hand sanitizer or disinfectant.





Jignasa Student study Project Titled



**Evaluating the Antimicrobial Activity of Hand Sanitizers Against
Bacterial and Fungal pathogens.**

To

**Commissionerate of Collegiate Education
Telangana**

By

Department of Microbiology

**TARA Government Degree & PG College,
Sangareddy**

Project Report:

**Evaluating the Antimicrobial Activity of Hand Sanitizers
against Bacterial and Fungal pathogens.**

Jignasa Student Study Project 2021-22

To



**Commissionerate of Collegiate Education
Telangana State**



By
Department of Microbiology
TARA Government Degree& PG (A) College
Sangareddy

EVALUATING THE ANTIMICROBIAL ACTIVITY OF HAND SANITIZERS AGAINST BACTERIAL AND FUNGAL PATHOGENS

JIGNASA STUDENT STUDY PROJECT 2021-22

To

**COMMISSIONERATE OF
COLLEGIATE EDUCATION
TELANGANA STATE**



By

- 1.P. Madhavi ,MZC III Year
- 2.K.Shalini, MZC III Year
- 3.N.Anitha, MZC III Year
- 4.P.Prashanth Kumar, MZC III Year
- 5.T.Ambika Madhu Shalini, MBCBTII Year

Guide
Dr.K.Jyothi
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**TARA Government College
Sangareddy(Autonomous)**
(Re-Accredited with 'B' Grade by NAAC)



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CERTIFICATE

This is to certify that the project work entitled with the "*Evaluating the Antimicrobial Activity of Hand Sanitizers against Bacterial and Fungal Pathogens*" submitted to Commissionerate of Collegiate Education is a original work done by 1.P. Madhavi ,MZC III Year, 2.K.Shalini, MZC III Year, 3.N.Anitha, MZC III Year, 4.P.Prashanth Kumar, MZC III Year, 5.T.Ambika Madhu Shalini , MBCBT II Year under the guidance & supervision of Dr.K.Jyothi, Asst. Prof. of Microbiology of Tara Govt. College (A), Sangareddy.

Principal,
Tara Govt. College (A),
Sangareddy



**TARA Government College
Sangareddy(Autonomous)**
(Re-Accredited with 'B' Grade by NAAC)



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CERTIFICATE

This is to certify that the project work entitled with the "*Evaluating the Antimicrobial Activity of Hand Sanitizers against Bacterial and Fungal Pathogens*" submitted to Commissionerate of Collegiate Education is bonafide record of work done by 1.P. Madhavi, MZC III Year, 2.K.Shalini, MZC III Year, 3.N.Anitha, MZC III Year, 4.P.Prashanth Kumar, MZC III Year, 5.T.Ambika Madhu Shalini, MBCBT II Year BMZ under my guidance and supervision and the student study project has been prepared based on their original research work.

PLACE: Sangareddy
DATE: 16/4/2022

Dr.K.Jyothi
Dr.K.Jyothi,
Asst.Prof.of Microbiology,
TARA College (A)
Sangareddy



DECLARATION

We declare that the student study project in Zoology subject entitled *Evaluating the Antimicrobial Activity of Hand Sanitizers against Bacterial and Fungal Pathogens* is the result of a Research study originally carried out by us under the guidance and supervision of Dr.K.Jyothi, Asst. Prof. of Microbiology of Tara Govt. College (A), Sangareddy

We also declare that no part of this Jignasa student study project is a reproduction from any other source, published or unpublished, without acknowledgement.

Place: Sangareddy

Date: 16/04/2022

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Student Study Projects-2021

TARA GOVERNMENT COLLEGE SANGAREDDY

(AUTONOMOUS)

ACKNOWLEDGEMENT

We would like to express our profound sense of gratitude and indebtedness to our project adviser Dr.K.Jyothi, Asst. Prof. Of Microbiology, TARA Government Degree & PG College, Sangareddy, for her valuable guidance, untiring cooperation at each and every phase of this Project work .

We also express our sincere thanks to Smt. M. Praveena, Principal of the college Sangareddy for encouraging us to actively participate in this Study project. We are thankful to the department of Microbiology faculty members for providing us the required facilities to complete our Project work.

We sincerely thankful to Head Department of Microbiology, Dr. Rajeswari P.Rao M.D. MNR Medical and Dental College, Dr.V.K. Asenath Vipula M.D. for providing Bacterial and Fungal Cultures for performing this Project work.



NASA



Student Study Projects-2021

TARA GOVERNMENT COLLEGE SANGAREDDY

(AUTONOMOUS)

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TITLE OF THE PROJECT

**EVALUATING THE ANTIMICROBIAL ACTIVITY OF HAND SANITIZERS
AGAINST BACTERIAL AND FUNGAL PATHOGENS.**

INTRODUCTION

During the year December 2019 several cases of pneumonia of unknown origin spread in China. Later in Jan 2021 it was announced as Corona Disease i.e. severe acute respiratory syndrome CoV-2 (SARS-CoV-2) caused by novel corona virus, which belongs to the Sub family Orthocoronaviridae (order: Nidovirales, subordination: Cornidovirineae, family: Coronaviridae). Corona viruses are enveloped viruses with lipid membrane derived from host cells. CoV includes four genera γ , β , α , δ , among the four CoV γ , β infect mammals where as α , δ infect birds. China reported the increasing occurrence of pneumonia in the city of Wuhan, during December 2019. In January 2020, a novel β -CoV was identified as the cause [1] the virus was given the official name of SARS-CoV-2 by the international Committee for Taxonomy of Viruses, while the WHO named the disease caused by the virus, COVID-19

In response to the corona virus disease 2019 pandemic (COVID-19) hand hygiene has taken a prominent role in effects to reduce SARS COV-2 transmission and infection. Hands are the primary mode of transmission of microbes and infection [2]. It is well recognized that hand hygiene is essential to reducing microbial burden, transmission, and infection. The density and species of bacteria that colonize the hands of individuals are highly variable and can be influenced by a number of factors including age, sex, ethnicity, and profession. Hand hygiene helps in preventing the spread of infectious diseases. In situations in which an individual does not have access to soap and water, the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) have recommended the use of alcohol rubs (also known as hand sanitizers) to reduce microbial burden.

To evaluate the utility of sanitizers both the user acceptability and the efficacy need to be evaluated. Very few publications and a little research work available on the efficacy of hand sanitizers against circulating strains of CoV- 2 C. The purpose of this study was to evaluate the effect of antimicrobial activity of hand hygiene agents against Bacterial and Fungal pathogens.

Hypothesis

Covid Pandemic



Hand Sanitizers



Bacterial & Fungal Pathogens



Antimicrobial Activity



Disc Diffusion and Zone of Inhibition of Growth



Efficacy of the sanitizer

The emergence of novel pathogens, bacterial or viral, has always posed serious challenges to public health around the globe. One of these dangerous pathogens is “severe acute respiratory syndrome corona virus 2 or SARS-CoV-2, more commonly known for causing corona virus disease 2019 or COVID-19, which has been declared a global pandemic by the World Health Organization in early 2020.

An effective and simple method for reducing transmission of infections in public or healthcare settings is hand hygiene. A range of hand sanitizers are available with various combinations of ingredients and modes of delivery.

Hands are the main pathways of germ transmission during health care. Hand hygiene is

therefore the most important measure to avoid the transmission of harmful germs. Hand Sanitizers are a type of disinfectant and antiseptic that is used to destroy microorganism (Pathogens) such as harmful viruses, Bacteria and Fungi. In 1938, Price⁶³ established that

bacteria recovered from the hands could be divided into two categories, namely resident or transient.

An antimicrobial is an agent that destroys or prevents the growth of microorganisms. Antimicrobial activity can be defined as a collective term for all active principles or agents that inhibit the growth of microorganisms prevent the formation of microbial colonies and may destroy microorganisms

Infectious diseases caused by bacteria, Viruses and fungi are the major cause of morbidity and mortality across the globe. Cholera, tuberculosis, diphtheria, typhoid are some of the infectious diseases caused by bacteria. Corona viruses are a family of viruses that can cause illnesses such as the common cold, severe acute respiratory syndrome (SARS).

Disc Diffusion method is most common method used routinely for determination of antibiotic sensitivity of bacteria by measuring zone of inhibition of growth.

Efficacy of a hand sanitizer can be demonstrated as the effect of the application of a hand hygiene formulation when tested in laboratory or in vivo situations. Determination of the Zone of inhibition of growth by Disc diffusion method to such formulations against bacteria and fungi can be done to estimate the efficacy of hand sanitizer.

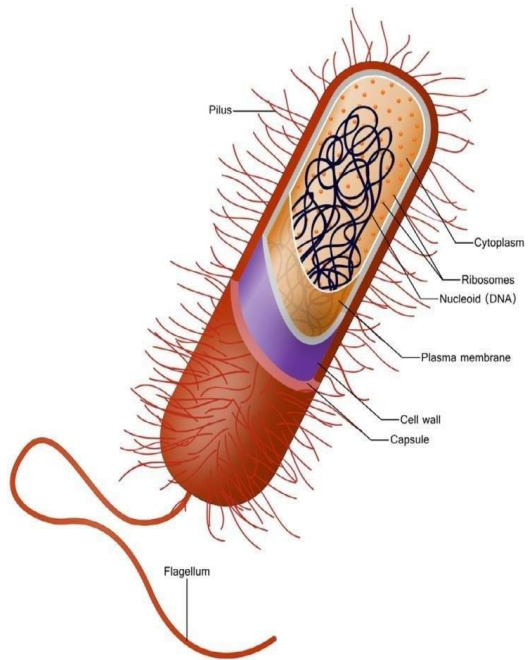


Fig1.Generic structure of a gram-negative bacterium.

Image by Ali Zifan, distributed under a CC-BY-SA 4.0 license.

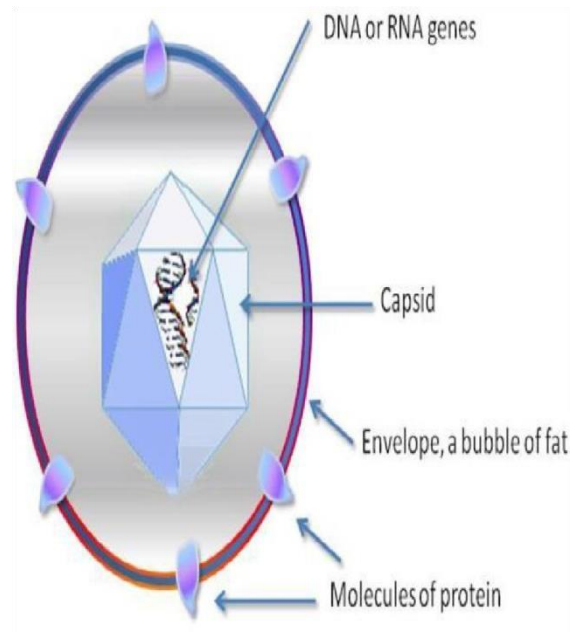


Fig 2. Generic structure of a virus with a lipid envelope.

Image by Graham Beards, distributed under a CC BY-SA 3.0 license.

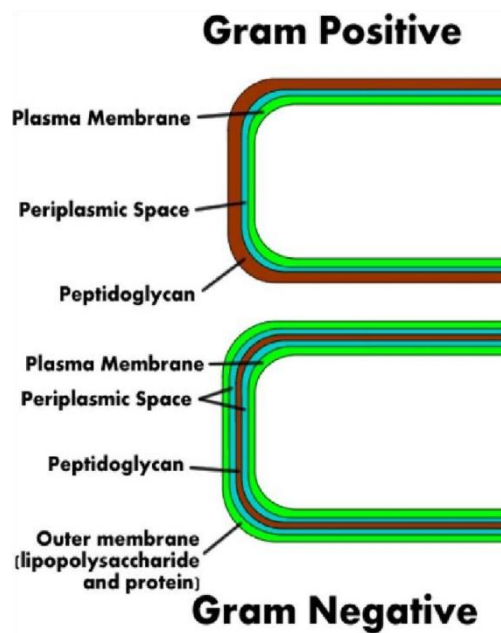


Fig 3. Gram-positive versus gram-negative bacteria. Image by Julian Onions, WikimediaCommons, Public Domain.

AIM & Objectives

To evaluate and compare the antimicrobial activity of three commercially available Hand Sanitizers and one herbal sanitizer against pathogenic bacteria and fungi

- ❖ The emergence of novel Severe Acute Respiratory Syndrome- Corona Virus-2 (SARS-CoV-2) is a serious health issue in public health domain.
- ❖ Non-therapeutic interventions such as practicing good hand hygiene continue to be the mainstay of protection from SARS-CoV-2.
- ❖ Hand sanitizers have been developed as a convenient means to decontaminate an individual's hands of bacterial pathogens in situations in which soap and water are not available
- ❖ The main objective of this project is to evaluate the antimicrobial activity of three commercially available Hand Sanitizers i.e. Dettol (Instant Hand sanitizer), Himalaya (Pure Hands), Lifebuoy (Hand sanitizer) and Herbal sanitizer.
- ❖ Three Bacterial pathogens one Gram positive *Staphylococcus aureus*, two Gram negative *Klebsiella pneumonia* and *Escherichia coli* and two Fungal pathogens *Candida* and *Aspergillus Sp.* Used in this study to test the antimicrobial activity.
- ❖ The method applied was Disc diffusion method, by using Zone of growth inhibition of bacterial and fungal pathogens collected from MNR medical college, Sangareddy.
- ❖ The efficacy of hand sanitizers was tested by the antimicrobial activity Assay with different bacterial & fungal pathogens with reference to the control standards.



**Figure 1. Hand disinfection steps
according to EN1500.**

doi:10.1371/journal.pone.0111969.g001

**Given by
WHO**

REVIEW OF LITERATURE

The global pandemic of COVID-19 has renewed public health focus on the efficacy of hand hygiene and respiratory hygiene to limit hand to face (mouth, eyes, nose) and person to person transmission of a highly contagious and novel virus like Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2) [Sayandip Mukherjee et al; 2020].

Skin micro biota, the potential association with health and disease [Rosenthal M, Goldberg D, Aiello A, Larson E, Foxman B. 2011]. Effect of hand hygiene on spread of infectious diseases [Kampf G, Kramer A. 2004.] Inactivation of severe acute respiratory syndrome coronavirus 2 by WHO-recommended hand rubs formulations and alcohols [Kratzel A, Todt D, V'kovski P, Steiner S, et al., 2020]. Community-based infections and the potential role of common touch surfaces as vectors for the transmission of infectious agents in home and community settings. [Scott E. 2013]. The word hygiene derives from the ancient Greek goddess Hygieia[The goddess of healing Encyclopaedia Britannica Online. [http://www.britannica.com/EBchecked/ topic/279225/Hygieia](http://www.britannica.com/EBchecked/topic/279225/Hygieia). Accessed: 2014 Mar 05]. Chemical disinfectants vary in their action mechanism and the majority of disinfectants of a chemical nature target the outer lipid layer of coronaviruses (CoVs) and inactivate the viral particles (Choi et al. 2021).Choi H, Chatterjee P, Lichtfouse E, Martel JA, Hwang M, Jinadatha C, Sharma VK (2021) Classical and alternative disinfection strategies to control the COVID-19 virus in healthcare facilities: a review. Environ Chem Lett: 1–7. <https://doi.org/10.1007/s10311-021-01180-4> (In press).

The bacteria reside on hands can be differentiated into resident and transient floras. The genus staphylococcus aureus, staphylococcus epidermidis, and Enterococcus faecalis are the common resident floras. Which have the ability to colonize deep layers of the skin and are resistant to mechanical removal, Transient floras include *S.aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa* colonize superficial layers of skin.

Antibiotic susceptibility testing can be done by a standardized single disk method [Bauer, A.W.; Kirby et al 1966]. Antibacterial action of cultures of a penicillium, with special reference to their use in the isolation of B. influenza [Fleming, A 1929].

The disc diffusion method is the gold standard for confirming the susceptibility of bacteria. Standardised disc diffusion was introduced by Bauer and Kirby's experiments in 1956. After finalizing all aspects of optimization by changing physical conditions [Bauer, A.W.; Kirby, W.M et.al., 2009]. Hand washing with Soap removes the body's own fatty acids from the skin which may result in cracked skin that provides an entry portal for pathogens [Larson EI, Hughes CA et al 1998]. In the absence of soap and water, the CDC recommends the use of alcohol-based hand rub containing at least 60% alcohol (w/w) for hand disinfection (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/hand-hygiene.html>). The lipid bilayer present in the enveloped viruses are denatured and destroyed by the natural, synthetic chemical surfactants present in the soaps and liquid sanitizers [Falk N.A. et al 2019].

Community based epidemiological studies have shown that beneficial effect of Hand sanitizer in reducing the transmission of illness. [Reynolds SA, Levy F, Walker ES. 2006]. Evaluation of antibacterial efficacy of some alcohol based hand sanitizers sold in Ilorin [Oke MA, Bello AB, Odebisi MB, El-Imam AM, Kazeem MO.2013]. Use of alcohol hand sanitizer as an infection control strategy in an acute care facility [Hilburn J, Hammond BS, Fendler EJ, Groziak PA. 2003]

World Health Organization provided clear guidelines on transmission of health care associated pathogens from one patient to another by HCW hands [WHO, 2009]. Comparative evaluations of efficacy of alcoholic and non alcoholic hand sanitizer's studies were done [Madan K et. al., 2012].

Research Methodology

Antibacterial Assay:

1. Bacterial cultures

Test bacterial cultures were obtained from MNR Medical College, Sangareddy. Clinical isolates of the bacteria ATCC strain - *E.coli* 25922, ATCC strain -*Staphylococcus aureus* 25923 *Klebsiella pneumonia*, Fungal Cultures *Candida albicans* and *Aspergillus niger* were used in this study. All the cultures were sub cultured and maintained in nutrient agar slants. Each culture was inoculated into nutrient broth and incubated for 24 hrs for each strain.

2. Preparation of Discs

Discs were prepared with Whatman filter paper No. 1 in size of about 6 mm in diameter with the paper puncturing machine. Blank discs were sterilized by dry heat method (Hot air oven).

3. Testing antimicrobial activity of Hand Sanitizers against bacterial & fungal cultures by Agar Disc Diffusion Method:

Commercially available and most used Hand Sanitizers namely Dettol (Instant Hand sanitizer), Himalaya (Pure Hands), Lifebuoy (Hand sanitizer) and Herbal sanitizer prepared by the students used in this study. The commercially available three sanitizers were chosen for this study based on the frequency of their purchase in the local Medical Shops.

Preparation of Herbal Sanitizer:

Composition: Neem leaves, Turmeric, Camphor, Alovera gel

To the bowl of water neem leaves were added and boiled for 10 minutes. Half table spoons of turmeric, two balls of camphor were added. This solution is kept aside for 5 minutes. Allow the sample to cool then add filtered extract of alovera gel.

Each bacterial strain was inoculated into nutrient broth and incubated at 37°C for 18h in order to reach exponential phase. Each culture broth was swab inoculated on to the nutrient agar plates. Agar surface was allowed to dry for few minutes. Four filter paper discs that were soaked in

Sanitizers were placed on each nutrient agar and Muller Hinton Antibiotic Assay medium respectively for bacteria and Sabourouds agar for Fungi plate along with standard antibiotic discs

susceptible for that particular organism aseptically. The standard antibiotic discs used were supplied by HiMedia. They are Erythromycin for *Staphylococcus aureus*, Tetracycline for *E.coli*, Tetracycline for *Klebsiella pneumoniae*. No specific antifungal standard was used in this study as control to study antifungal activity. Plates were incubated at 37°C for 24 hours, after incubation zone of inhibition of bacterial & fungal growth was observed in terms of the diameter of inhibition zone in mm.

Table.1. Hand sanitizers used in this study and their Composition

Hand Sanitizer	Ingredients
Life buoy	Purified water, USP, carbomer, Propylene glycol, Aminomethyl propanol, PEG-12, Dimethione, disodium EDTA, Aloe Barbadensis extract, Maltodextrin, Potassium sorbate, sodium Bezoate
Dettol	Alcohol-72.34%, water, Propylene Glycol, Acrylate s/c10-30, Alkyl Acrylate, propyl ethylene diamine, perfume
Himalaya	300 mg extract from coriandrum sativum 0.30 mg Ushira (Vitiveria zizanioides) 0.30 mg Nagaramusta (Cyperus Scariosus) 0.25 mg Shati (Hedychium picatum) 0.10 mg Nimba (Azadirachta indica)
Herbal	Neem leaves, Turmeric, Camphor, Alovera gel

Figure1. Different Hand Sanitizers used in this study



Schematic Representation Of Agar Disc, Diffusion Test To Determine Susceptibility Of Test Organisms To Hand Sanitizers

Four Different Hand Sanitizers were used and sterilized Nutrient ,Sabourads agar plates were inoculated with standardized test organisms



Sterile cotton swab dipped into tube containing inoculum and excess removed by rotating firmly against inside wall of the tube above the liquid level



Sterile 6 mm cork borer used to prepare 4 equally spaced holes in agar plate with one set another set with Disc soaked in Sanitizer placed on another set of the plates and agar plugs discarded using sterile needle



Swab was streaked over agar surface three times while rotating the agar plate at an angle of 60° after each application



Fifty microliters of the hand sanitizer was then introduced into each of the 4 wells while antibiotic disc was placed to serve as control



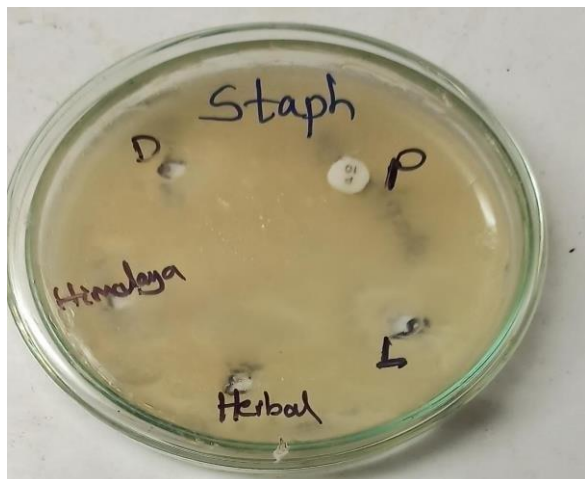
This was done for all the test organisms and plates were incubated in incubator for 24 h at 37°C in an upright position



Analysis of zone of inhibition to evaluate Antimicrobial efficacy of different hand sanitizers indicating susceptibility of the respective test organism

Figure 2.

1. Staphylococcus aureus showing zone of growth inhibition In Diffusion Method



2. Herbal Sanitizer ingredients



3. Preparation of Hand Sanitizer



4. Measuring Zone of Inhibition



Analysis of Data

The observations made for recorded and represented in the Table 1& 2. Graphs were plotted based on the data.

Table 1. Antimicrobial efficacy of 4 sanitizers against 3 Bacterial Strains

S.No	Name of the Bacteria	Name of the Sanitizer	Zone of Inhibition in mm	
			Disc Method	Diffusion Method
1	Klebsiella pneumonia	Dettol	4.5	3.2
		Lifebuoy	5.0	2.6
		Himalaya	6.5	3.2
		Herbal	8.8	6.8
		Control (Tetracycline)	10	8.1
2	E.Coli	Dettol	7.6	4.3
		Lifebuoy	5.8	4.1
		Himalaya	4.3	3.2
		Herbal	8.2	8.0
		Control(Tetracycline)	12	8.0
3	Staphylococcus aureus	Dettol	3.8	2.3
		Lifebuoy	6.2	3.6
		Himalaya	7.8	4.5
		Herbal	7.4	6.3
		Control (Penicillin)	4.5	2.8

Graph.1. Effect of 4 Different Hand Sanitizers on 3 Bacterial Strains

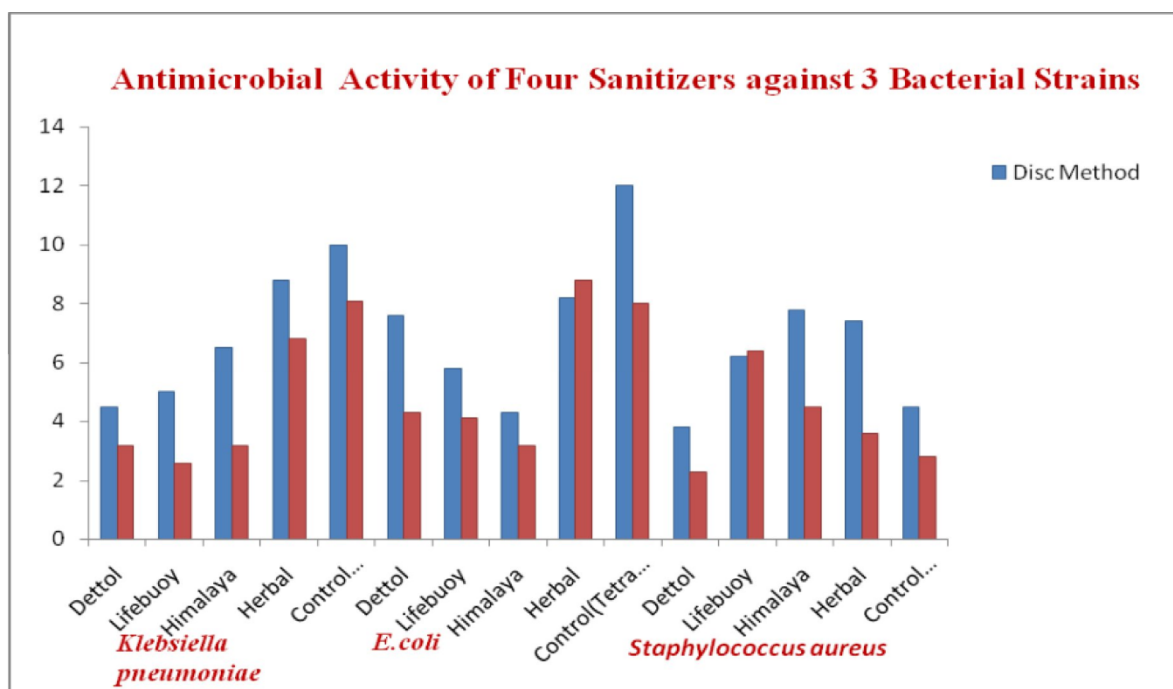
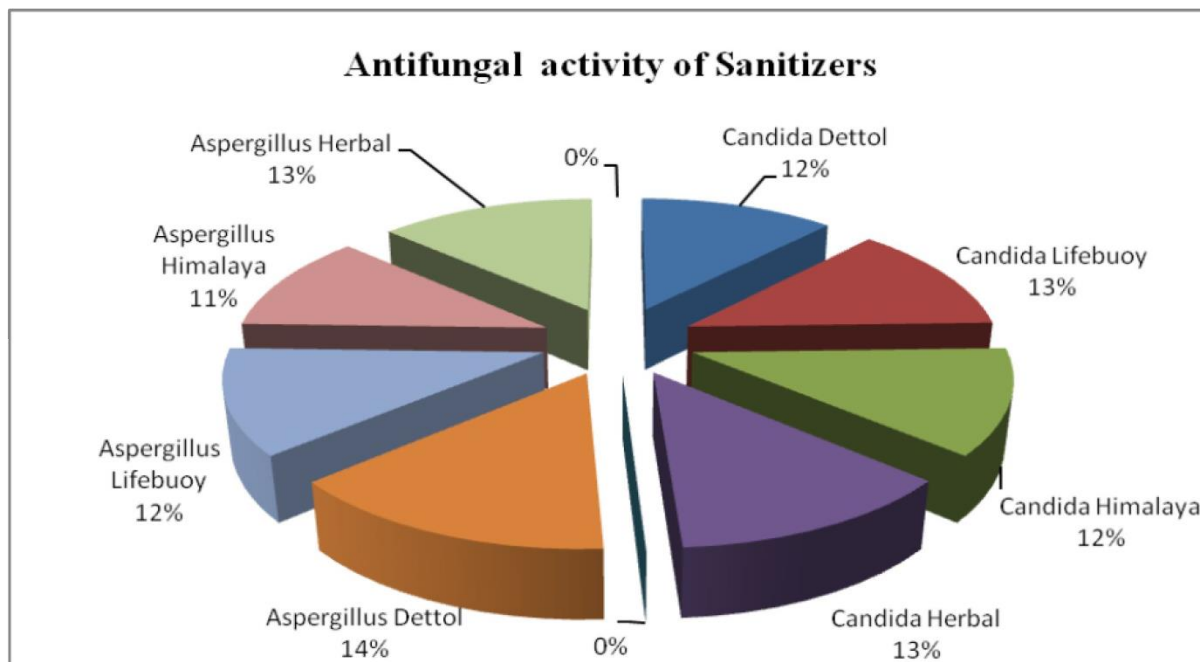


Table.2. Antimicrobial efficacy of 4 sanitizers against two fungal strains

S.No	Fungi	Sanitizer	Zone of Inhibition in mm
1	Candida albicans	Dettol Lifebuoy Himalaya Herbal	1.9 2.0 1.9 2.0
2	Aspergillus niger	Dettol Lifebuoy Himalaya Herbal	2.3 1.9 1.8 2.1

Graph 2. Zone of Inhibition (in mm) Measured after 76 hrs of incubation of Different Hand Sanitizers with 2 Fungal Strains



Findings

In the present study Four Hand sanitizers, 3 commercially available one herbal sanitizer were tested for antimicrobial activity against three pathogenic bacteria *Klebsiella pneumonia*, *Escherichia coli*, *Staphylococcus aureus* respect effective against all the test organisms. The antimicrobial effectiveness was assessed by measuring the zone of inhibition against the particular test organism in two different methods i.e. Disc method and Diffusion method.

Maximum zone of inhibition (in mm) was observed in disc diffusion method compared to diffusion method. Maximum inhibition of growth for *Klebsiella pneumonia* observed was 8.8, (in mm) respectively for the Herbal Sanitizer with reference to the control Tetracycline.

Minimum growth inhibition was observed with commercially available sanitizers

Himalaya, Lifebouy, Dettol Respectively.

For the *E.coli* also Herbal Sanitizer showed maximum growth of inhibition 8.2,8.0 (In mm) with reference to the control.

For *Staphylococcus aureus* maximum growth inhibition was observed with 7.4, 6.3 (In mm) Herbal Sanitizer compared to the Himalaya, Lifebuoy, Dettol respectively (Table.1.)

The observations made were represented in the Table 1,2 as mean of two values observed on Agar plates Figure.2. Maximum growth of inhibition was observed with *K. pneumoniae*, *E.coli*, *S.aureus* against Herbal Sanitizer. The range of inhibition was varied with different commercial hand sanitizers with three bacteria *K. pneumoniae*, *E.coli*, *S.aureu*.

The inhibition of growth of *Klebsiella* for the effective sanitizer i.e. Herbal Sanitizer against standard antibiotic Tetracycline was slightly low (10, 8.1), same observations are made with other two bacteria *E.Coli*, *Staphylococcus aureus* with standards tetracycline Penicilin respectively.

The zone of inhibition observed for *Candida albicans* was 2.0 (in mm) for both Herbal and Dettol sanitizers 1.9 (in mm) for Lifebuoy and Himalaya Sanitizers. For the *Aspergillus niger* the zone of inhibition was Dettol 2.3, Herbal 2.1, Lifebuoy 1.9, Himalaya 1.8 (in mm) respectively.

The effectiveness of hand sanitizers in terms of zone of inhibition of bacteria was highest against bacteria compared to fungi.

Conclusions

- In the current piece of small work Herbal sanitizer possessed most antibacterial effect in the form of zone of inhibition against two Gram negative, one Gram positive bacteria strains i.e. *Klebsiella pneumoniae*, *Escherichia coli*, *Staphylococcus aureus* sps. used in this study.
- Three commercially available Sanitizers i.e. Dettol, Lifebuoy, Himalaya has shown less efficacy against both bacterial and fungal pathogens.
- Even for the herbal sanitizer the efficacy of the sanitizer was less with reference to the standards i.e. Pencillin, Tetracycline respectively which are specific for that particular Bacterium.
- The sanitizers tested in this study for antifungal activity shown very less effect compared to the antibacterial activity.

Suggestions

- ❖ The present study has its own limitations – as only the antimicrobial efficacy of Four different hand sanitizers was assessed. Further studies are required to assess the exact quantity and duration of application of hand sanitizer or disinfectant.
- ❖ There is an urgent need for developing eco-friendly technologies that offer safer and more effective disinfection methods to combat the ongoing pandemic, along with conferring protection to the environment and living beings from the potentially hazardous effects of chemical disinfectants.

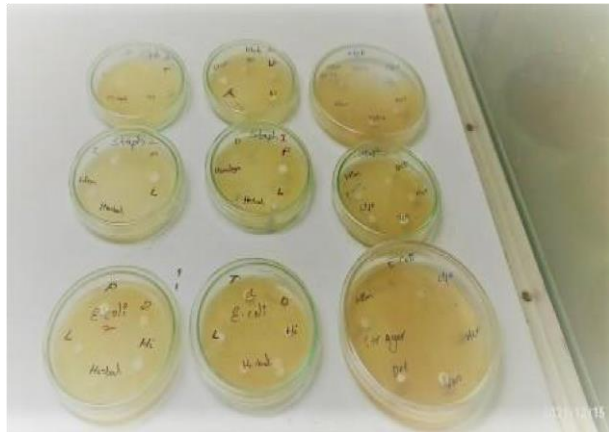
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Photographs Taken During Project Work



CERTIFICATES OF PARTICIPATION:





Government of Telangana
Commissionerate of Collegiate Education



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This certificate is awarded to K. Shalini
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Academic Guidance Officer



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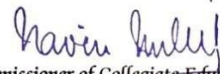


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GOVERNMENT OF TELANGANA
COMMISSIONERATE OF COLLEGIATE EDUCATION, HYDERABAD

ATTENDANCE CERTIFICATE

This is to certify that Dr./Sri./Smt. Dr. K. Jyothi
Associate/Assistant Professor of MICROBIOLOGY, TARA Government Degree
College, SANGAREDDY has attended Jignasa-2021 Student
Study Projects State Level Presentations conducted by Commissionerate Collegiate
Education, Telangana, Hyderabad on 30/4/2022. Hence, his/her absence in the
college shall be treated as On Duty.



For Commissioner of Collegiate Education.

Hyderabad

Date: 30/4/2022

DEPARTMENT OF ZOOLOGY:

PHOTO:



SYNOPSIS OF STUDENT STUDY PROJECT IN ZOOLOGY SUBJECT

TOPIC

**ANTIFEEDANT ACTIVITY OF CERTAIN PLANT EXTRACTS AGAINST TEAK
SKELETONIZER, EUTECTONA MACHAERIS WALK.**

SUBMITTED TO

THE CCE,

HYDERABAD, T.S.

BY

1. A. Hanok, III YR BZC E/M
2. K. Namdev, III YR BZC E/M
3. P. Srija, III YR MZC
4. K. Vennela, III YR BZC E/M
5. R. Abhisheka Sumalatha, III YR MZC
6. B. Sandeep Kumar, III YR MBZ

Guide teacher

L. MAHESH,

Asst. Prof. of Zoology,

TARA GOVT. COLLEGE,

SANGAREDDY

Synopsis: *Tectona grandis* is a tropical hardwood tree species. Teak plantations have been widely established throughout the tropics to produce high quality timber. More than 187 insect pest species have been found feeding on the living teak tree in India. *Eutectona machaeralis* is a major pest on teak. It is popularly known as the teak leaf skeletonizer. The larvae of *Eutectona machaeralis* feed on the green leaf tissue leaving the veins intact. Partially damaged leaves are not shed and even the fully skeletonized leaves are retained by the trees for a long time so that affected trees have a dry and fire scorched appearance from a distance.

Pesticides cause lethal effects to non-target organisms in agro-ecosystem. Repeated application of synthetic organic insecticides results in the pest resistance and outbreak. Bio-pesticides are an alternative to synthetic pesticides. Antifeedant is defined as any substance that reduces consumption of leaves or other plant materials by an insect. Antifeedants do not kill pests immediately; suppress insect feeding for several days and cause mortality.

Much work has been done on the insecticidal and antifeedant properties of the extracts of *Azadirachta indica*, *Annona squamosa*, *Achyranthes aspera*, *Nicotiana glauca*, *Capsicum annuum* and *Allium sativum* against various other agricultural pests. Few plants such as *Acacia arabica*, *Madhuca longifolia* were tested for their antioxidant, antimicrobial, antidiabetic properties. *Parthenium hysterophorus* has been found to be an effective antifeedant against many pests. But its antifeedant property against *Eutectona machaeralis* is not evaluated. Hence, the current study is aimed at the same.

Experiments were conducted to investigate the antifeedant activity of leaf extracts of *Acacia arabica*, *Parthenium hysterophorus* and *Madhuca longifolia* against teak skeletonizer, *Eutectona machaeralis* Walk. The study was carried out from October to December, 2021 in the Zoology laboratory of Tara Government Degree and PG College, Sangareddy. In this experiment 1% ethanol extracts of *A. arabica* bark experiment 1% ethanol extracts of *P. hysterophorus* and

M. longifolia leaves were used. Third instar larvae of *Eutectona machaeralis* were collected from the Teak plants in the college garden and reared in the laboratory. No choice method was followed. Among the plant extracts tested, bark extracts of *Acacia arabica* showed the highest Antifeedant Index value (38.01 %). A.I values for *P. hysterophorus* and *M. longifolia* were 16.02% and 0.59 % respectively. The experiment indicates that bark extracts of *A. arabica* have high antifeedant value. To know which specific phenol compound of *A. arabica* leaf extracts is responsible for this antifeedant property, further studies are required.

**ANTIFEEDENT ACTIVITY OF CERTAIN PHYTOCHEMICALS AGAINST
TEAK LEAF SKELETONIZER, EUTECTONA MACHAERALIS**

STUDENT STUDY PROJECT SUBMITTED TO

THE CCE, HYDERABAD, T.S.

FOR JIGNASA STUDENTS STUDY PROJECT

BY

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2. **K NAMDEV, III YR BZC E/M**
3. **P. SRIJA, III YR MZC**
4. **K. VENNELA, III YR BZC T/M**
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Guide teacher

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**ANTIFEEDENT ACTIVITY OF CERTAIN
PHYTOCHEMICALS AGAINST TEAK
LEAF SKELETONIZER, EUTECTONA
MACHAERALIS**

**STUDENT STUDY PROJECT SUBMITTED TO THE CCE,
HYDERABAD, T.S.**

**FOR JIGNASA STUDENTS
STUDY PROJECT BY**

1. **A. HANOK, III YR BZC E/M**
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CERTIFICATE

This is to certify that the Jignasa student study project in Zoology subject entitled “ **Antifeedant activity of certain phytochemicals against teak leaf skeletonizer, *Eutectona machaeralis*** “ submitted to The Commissionerate of Collegiate Education is a original work done by 1) A. Hanok, III YR BZC E/M, 2) K. Namdev, III YR BZC E/M, 3) P. Srija, III YR MZC, 4) K. Vennela, III YR BZC T/M, 5) R. Abhisheka Sumalatha, III YR MZC & 6) B. Sandeep, III YR MBZ under my guidance and supervision and the student study project has been prepared based on their original research work.

Place: Sangareddy

Date: 16/04/2022



L. Mahesh,
Asst. Prof. of Zoology,
Tara Govt. College (A),
Sangareddy.

CERTIFICATE

This is to certify that, the student study project in Zoology subject entitled “**Antifeedant activity of certain phytochemicals against teak leaf skeletonizer, *Eutectona machaeralis*** “ submitted to The Commissionerate of Collegiate Education is bonafide record of work carried by 1) A. Hanok, III YR BZC E/M, 2) K. Namdev, III YR BZC E/M, 3) P. Srija, III YR MZC, 4) K. Vennela, III YR BZC T/M, 5) R. Abhisheka Sumalatha, III YR MZC & 6) B. Sandeep, III YR MBZ , under the guidance & supervision of L, Mahesh, Asst. Prof. of Zoology of Tara Govt. College (A), Sangareddy.



Principal,

Tara Govt. College (A),
PRINCIPAL
TARA GOVT COLLEC.
Sangareddy
(AUTONOMOUS)
SANGAREDDY-502 001

DECLARATION

We declare that the student study project in Zoology subject entitled “ **Antifeedant activity of certain phytochemicals against teak leaf skeletonizer, *Eutectona machaeralis*** “ is the result of a study originally carried out by us under the guidance and supervision of Sri L, Mahesh, Asst. Prof. of Zoology of Tara Govt. College (A), Sangareddy.

We also declare that no part of this Jignasa student study project is a reproduction from any other source, published or unpublished, without acknowledgement.

Place: Sangareddy

Date: 16/04/2022

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We are thankful to our Supervisor L. Mahesh Sir, Asst. Prof. of Zoology, for enlightening us regarding the procedure of scientific research and encouraging us to participate in this study project.

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TITLE OF THE PROJECT

**ANTIFEEDENT ACTIVITY OF CERTAIN PHYTOCHEMICALS AGAINST TEAKLEAF
SKELETONIZER, EUTECTONA MACHAERALIS**

INTRODUCTION

The teak leaf skeletonizer, *Eutectona machaeralis* (Walker) (Lepidoptera: Pyralidae) is one of the major pests on Teak plants. Teak plant, *Tectona grandis*, is a tropical hardwood tree species. Teak plantations have been widely established throughout the tropics to produce high quality Timber in trees of good growth and stem form. *E. machaeralis* causes defoliation, poor seed formation and seed setting in teak plants and thus reduces the quality and quantity of the timber. Lot of economic loss occurs due to this pest.

Chemical control involves the use of synthetic pesticides. Pesticides cause lethal effects to non-target organisms in agro-ecosystem. Repeated application of synthetic organic insecticides results in the pest resistance and outbreak. Bio-pesticides are an alternative to synthetic pesticides. Antifeedants are one type of bio-pesticides. They reduce consumption of leaves or other plant parts by the insect pests. Many antifeedants do not kill pests immediately. They suppress insect feeding for several days and cause mortality. Many phytochemicals have already been tested for their antifeedant activity on various other pests. A limited literature only is available on the *Eutectona machaeralis*.

Experiments were conducted to investigate the antifeedant activity of extracts of *Acacia arabica*, *Parthenium hysterophorus* and *Madhuca longifolia* against teak skeletonizer, *Eutectona machaeralis*. In this experiment, 1% ethanolic bark extracts of *A. arabica*, 1% ethanolic leaf extracts of *P. hysterophorus* and *M. longifolia* were used. Third instar larvae of *Eutectona machaeralis* were collected from the Teak plants in the college garden and reared in the laboratory. No choice method was followed. Among the plant extracts tested, bark extracts of *Acacia arabica* showed the highest Antifeedant Index value (38.01). AFI values for *Parthenium hysterophorus* and *Madhuca longifolia* were 16.25 and 1.07 respectively. The experiment indicates that bark extracts of *Acacia Arabica* have high antifeedant value. To know which specific chemical molecule of ***Acacia arabica*** bark extracts is responsible for this antifeedant property, further studies are required.

STATEMENT OF THE PROBLEM

Eutectona machaeralis (Walker) (Lepidoptera: Pyralidae) is a major pest on Teak plants. It is popularly known as the teak leaf skeletonizer (Tewari, D.N, 1992). In addition to defoliation, it also feeds on the inflorescence and is responsible for poor seed formation and seed setting in teak during epidemic periods (Roy Choudhury et al, 2001). The larvae of *Eutectona machaeralis* feed on the green leaf tissue between the networks of veins leaving the skeleton of veins intact. Partially damaged leaves are not shed and even the fully skeletonized leaves are retained by the trees for a long time so that affected trees have a dry fire scorched appearance from a distance (Khin Mar Myint, 2016).

Teak plant, *Tectona grandis*, is a tropical hardwood tree species. It is a native of Southeast Asian countries. Teak plantations have been widely established throughout the tropics to produce high quality Timber in trees of good growth and stem form. The growth of the teak plants will be affected a lot by the *Eutectona machaeralis* hence the quality of the timber also. Lot of economic loss occurs due to this pest (Dr. N. Roychoudhury, 2013).

Chemical control involves the use of synthetic pesticides. Pesticides cause lethal effects to non-target organisms in agro-ecosystem (Dubey et al, 2013). Repeated application of synthetic organic insecticides results in the pest resistance and outbreak (Singh et al, 2002).

Bio-pesticides are an alternative to synthetic pesticides. They possess an array of properties including antifeedant, less toxicity to beneficial organisms, easy availability and fast degradation. Antifeedant is defined as any substance that reduces consumption of leaves or other plant parts by an insect. Many antifeedants do not kill pests immediately; suppress insect feeding for several days and cause mortality (Ignacimuthu and Vendan, 2008) (Mr. Ga. Bakavathiappan, 2014)..

Many phytochemicals have already been tested for their antifeedant activity on various other pests. A limited research only is available on the *Eutectona machaeralis*. Hence, our study was aimed at discovering the antifeedant properties of ethanolic bark extracts of *Acacia arabica*, ethanolic leaf extracts of *Parthenium hysterophorus* and *Madhuca longifolia* against *E. machaeralis*.

AIMS & **OBJECTIVES**

Teak plantations have been widely established throughout the tropicsto produce high quality Timber. *Eutectona Machaeralis* is one of the major pests on teak plants. Currently no control method is employed against *E. Machaeralis*. This pest can be controlled by using insecticides, however insecticides usage is costly and it causes environmental damage.

Biological control measures are cost effective and eco-friendly. Using phytochemicals as antifeedants against agricultural pests is one type of biological control method. In many plants phenolic compounds are responsible for antifeedant properties. Lot of work has been done by the researchers on various agricultural pests to control them by phytochemicals. Many plants such as *Azadirachta indica*, *Annona squamosa*, *Achyranthes aspera*, *Nicotiana tabacum*, *Capsicum annuum*, *Parthenium hysterophorus* and *Allium sativum* were found to posses various chemical compounds that have insecticidal, antifeedant properties. But only limited literature only is available on *E. machaeralis*.

Madhuca longifolia leaf extracts and bark extracts of ***Acacia arabica*** have phenolic compounds and the extracts of these plants were discovered to possess lot of medicinal properties. But their antifeedant properties were not evaluated so far. ***Parthenium hysterophorus*** leaf extracts were found to possess antifeedant properties against *E. machaeralis*.

In the present study, we tried to know whether the leaf extracts of *M. longifolia* and bark extracts of *A. arabica* have antifeedant properties against *E. machaeralis* or not. The objective of our study includes if the above mentioned two phytochemicals have antifeedant property, comparing their effectiveness with already proven phytochemicals of *P. hysterophorus* against *E. machaeralis*.

REVIEW OF LITERATURE

Teak Leaf Skeletonizer:

Teak (*Tectona grandis*) is an undisputed global leader of high quality tropical timbers. Teak is truly an Indian species (Hedegart, 1975) and referred to as standard timber for comparative evaluation of the qualities of other tropical hardwoods in assessing their utilization potential (Bhat et al., 2005) (Dr. N. Roychoudhury, 2013).

In India, Teak, *Tectona grandis* grows naturally in 9 million hectare of area and considered as one of the top five tropical plantation species of the world (M.K. Tripathy, M. Rout, 2018).

Teak is known to be infected by various kinds of insects including leaf feeders and stem borers (Beeson, 1941; Sudheendrakumar, 1994) (Khin Mar Myint, 2016).

About 187 insects' species have been found feeding on living teak tree in India which includes 78 species from order lepidoptera, 40 species from order Coleoptera and 18 species from order Orthoptera (Hutacharern and Tubtim, 1995) (M.K. Tripathy, M. Rout, 2018).

Teak defoliator, *Hyblea puera* and teak leaf skeletonizer, *Eutectona machaeralis* are considered as key stone pests, causing large scale severe damage like epidemic defoliation in nurseries, manmade and natural forests, resulting in retardation of growth, less flowering, poor fruits setting and less seed production (Beeson, 1941; Mathur, 1960; Nair, 1988) (Dr. N. Roychoudhury, 2013).

Eutectona machaeralis (Walker) (lepidoptera: Pyralidae) is popularly known as the teak leaf skeletonizer (Tewar, 1992) (Dr. N. Roychoudhury, 2013)

E. machaeralis caterpillars are small, pale yellowish in color and remain in false webbing over the leaves, mostly prefer the old leaves and become more abundant towards the end of the season. It feeds by skeletonising the leaves due to feeding on green matters; affected trees have a dry-fire scorched appearance from a distance. Oligophagus also feeds on teak flowers and buds under certain conditions (M.K. Tripathy, M. Rout, 2018).

The larvae of *Eutectona machaeralis* feeds on the green leaf tissue between the networks of veins leaving the skeleton of veins intact partially damaged leaves or not shed and even the fully skeletonized leaves are retained by the trees for a long time so that affected trees have a dry fire scorched appearance from a distance (Khin Mar Myint, 2016)

In addition to defoliation it (larva of *E. machaeralis*) also feeds on the inflorescence and is responsible for poor seed formation and seed setting in teak during epidemic periods (Roy Choudhury, 2013).

Considering the magnitude of economic loss caused by *Hyblea puer* and *Eutectona machaeralis*, a great deal of experimentation have been made in past to control these pests, including aerial spraying of insecticides, but still it remains a burning problem (Dr. N. Roychoudhury, 2013).

Chemical control:

Chemical control involves the use of synthetic pesticides. Pesticides cause lethal effects to non-target organisms in agro-ecosystem (Dubey et al, 2013) (Mr. Ga. Bakavathiappan, 2014).

Repeated application of synthetic organic insecticides results in the pest resistance and outbreak (Singh et al, 2002) (Mr. Ga. Bakavathiappan, 2014).

Indiscriminate use of chemical pesticides results in toxic residues in food, water, air, and soil which affect human health (Arivoli and Tennyson, 2013) (Mr. Ga. Bakavathiappan, 2014).

Antifeedants:

The history of the research substances that show antifeedant effects dates back to the 1930s as early as 1932 Metzger and Grant tested about 500 plant extracts against *Popilla japonica* although results were not substantially encouraging. Later, Pradhan et al (1963) evaluated extracts of Indian neem tree *Azadirachta indica* that prevented feeding by the desert locusts. Although terrestrial plants produce a diverse array of secondary metabolites probably more than 100,000 unique compounds (Isman 2002) today about 900 compounds have been identified to possess feeding deterrence against insects (Koul 2005) (Roman Pavela, 2011).

Antifeedant is defined as any substance that reduces consumption by feeding an insect. Many antifeedants do not kill pests immediately; suppress insect feeding for several days and cause mortality. (Ignacimuthu and Vendan, 2008) (Mr. Ga. Bakavathiappan, 2014).

Earlier studies have indicated that antifeedant compounds derived from seeds, flowers, fruits, leaves and roots of the plant could be used as effective bio compounds against the growth and metamorphosis of the noxious insects. So far 6000 alkaloids, 3000 terpenoids several thousands of flavonoids, 500 quinones, 650 polyacetylenes and 4000

amino acids have been reported and many of them are able to protect the plants from insect and pathogens (Elumalai, 2010) (Mr. Ga. Bakavathiappan, 2014).

Antifeedant activity studies against *E. machaeralis*:

0.5% methanol extracts of *Aloe Vera* leaves to be the most effective and potent antifeedant against Teak leaf skeletonizer, *Eutectona machaeralis* (P.B, Meshram, N. Kulkarni and K.C. Joshi, 1994).

Out of the 5% crude extracts of fresh leaves of 32 different medicinal and natural plants against third instar larvae of teak skeletonizer, *Eutectona machaeralis*, fresh leaf extracts of *Calotropis procera*, *Datura metal* and *Azadirachta indica* were found to be most effective against teak skeletonizer, *Eutectona machaeralis* (P.B. Meshram, 1995).

Currently no control method is employed against *Eutectona Machaeralis* especially in manmade and natural forest of teak. This pest can be controlled by using insecticides, however insecticides provide only short term control and their use entails recurring cost and and long term environmental damage (D.N Roy Choudhury et al, 2013).

Antifeedant activity studies against other insect pests:

Ovicidal effects of 14 plant extracts were evaluated against the eggs of *Hyblea puera* revealed that the *Azadirachta indica* kernel extract was found effective in causing high rate of egg mortality followed by leaf extract of *Melia azadirachta* and *A. indica* (Javaregowda and L. Krishna Naik, 2007).

Antifeedant activity of Azadirachtin-A and Parthenin against *Spodoptera litura* was compared by short term dual choice and no choice tests. Concentration dependant antifeedancy was noticed only in dual choice test. Azadirachtin-A was considerably more effective than Parthenin in causing antifeedancy (Sudhendu Datta and D. B. Saxena, 1997).

Ethyl acetate extracts of *Achyranthes aspera* showed higher antifeedant index and insecticidal activity against fourth instar larvae of Epilachna beetle, *Henosepilachna vigintioctopunctata*, a severe pest on brinjal (Alagarmalai Jayasankar, Selvaraj, Premalatha et al, 2014).

Since Jasmonate inducible lectin called *Nicotiana tabacum* agglutinin (NICTABA) expression is also induced after insect herbivory in tobacco leaves, a role in the defence response of tobacco was suggested. Purified NICTABA was shown to be strongly resistant to proteolytic degradation by enzymes present in the Lepidopteran midgut. The larval performance of the generalist pest insect, *Spodoptera littoralis* was enhanced when transgenic *N. tabacum* plants in which NICTABA expression is silenced were used to feed the larvae. *Nicotiana attenuata* species lacks a functional NICTABA gene. When transgenic

N. attenuata plants which have functional NICTABA genes were used in feeding experiments with *S. littoralis* larvae, a clear reduction in mass gain and significantly slower development were observed (Gianni Vandenborre, Karin Groten, Guy Smagghe, Nausicaä Lannoo, Ian T. Baldwin, Els J. M. Van Damme, 2010).

Antifeedant activity of *Parthenium hysterophorus* was more than *Ageratina adenophora* against Fall Army worm. Both plant extracts exposure showed deformities in larval, pupal and adult stages of the Fall Armyworm, *Spodoptera frugiperda*.

P. hysterophorus and *A. adenophora* both have potential Antifeedant, Larvicidal and growth inhibiting activity against *Spodoptera frugiperda* (Wasuyogesh.H, 2013).

Different concentrations of *Annona squamosa* (Leaves) in water were presented antifeedant activity against *Diacrisia obliqua*, which is a polyphagous insect pest causing serious damage to Soybean Crop, was noticed. The activity was found to be concentration dependent (Alok Verma et al, 2010).

Insecticidal effects of ethanolic extracts of *Capsicum annum* and *Allium sativum* against *Myzus persicae*, Green peach aphid, on Radish (*Raphanus sativus*) leaf discs showed the highest mortality in nymph and adult stages (Erdogan.P, 2015).

Studies on *Madhuca longifolia* & *Acacia arabica*:

The ethanol extract and saponins mixture of *Madhuca longifolia* (sapotaceae) were evaluated for anti-inflammatory activity using acute (carrageenan-induced inflammation), sub-acute (formaldehyde-induced inflammation), and chronic (Cotton pellet induced granuloma) models of inflammation in rats. Saponins alone seem to be responsible for the anti-inflammatory activity in the studied models. MLEE (*Madhuca longifolia* ethanol extract) at a dose level of 1.5 and 3 mg/kg significantly reduced the edema induced by carrageenan in acute models of inflammation, inhibiting both phases of inflammation. Both the extracts had a more effective response than the reference drug diclofenac sodium in the subacute inflammation model. Results indicated a significant anti-inflammatory activity by *M. longifolia* saponins in cotton pellet granuloma (Ramchandra D. Gaikwad et al, 2001).

The polyphenol rich active fraction of *Acacia arabica* is a potent free radical scavenger and hepatoprotective and protects TBH-induced lipid peroxidation and CCl₄ - induced hepatic damage (S. Ramachandran & S. K. Mitra, 2007).

Methanolic and aqueous⁸ extracts of *Acacia arabica*, *Murraya koenigii*, *Catharanthus roseus* and *Rauwolfia serpentina* plants leaves were screened for the potency of antioxidant and antidiabetic activity. The results suggest that these plants could serve as a

source of natural antioxidants and antidiabetic agents with potential applications in the pharmaceuticals industry (Ram Aadil et al, 2012).

Research methodology:

Leaf discs are commonly used in preference of consumption bioassays with chewing insects. These assays are important in estimating the Biological potential of the antifeedant effect of the plant extracts in screening studies and they correspond as much as possible to the Conditions of the practical application (Roman Pavela, 2011).

Individual types of biological assays used for evaluating antifeedant efficiency are discussed by Koul (2005). However, in general, such assays can be divided into two groups according to the mode of the experiment: a choice assay or a no choice assay. The principle is that insects can choose either control or treated discs (choice) or insects may be exposed to the test substance only (no choice). The no choice situation often is more representative of our agricultural system especially for monophagous species but at the same time it is very sensitive (Roman Pavela, 2011).

The general procedure adopted in this test is that measured leaf disc are punched out from substrates and treated either on one side or both sides with a known quantity of test material in a carrier solvent. It is preferable to use emulsified solution in water in order to avoid interference with leaf disc texture due to solvents (Isman, 2002). A method has been described by which leaf surfaces can be covered with a uniform amount of a test chemical for bioassay with leaf-feeding insects (Roman Pavela, 2011).

After application, the leaf discs are dried at room temperature and then fed to the insects. Usually the arenas used are Petri dishes of Variable size in which one treated and one control disc is placed (choice) or both the leaf discs are treated (no choice). In certain experiments five to ten treated and untreated leaf discs are used and placed alternately in the Petri dishes in a situation. The number of larvae introduced into each arena is variable depending upon the size and stage of the larvae used (Roman Pavela, 2011).

Feeding deterrence or AntiFeedant Index (AFI) (%) = $(C-T) / (C+T) \times 100$,
Where C and T are the consumption of control and treated discs, respectively (Koul, 2005; Roman Pavela et al., 2008).

RESEARCH METHODOLOGY

COLLECTION OF PLANT MATERIALS:

The leaves of *M. longifolia* and *P. hysterophorus* and bark pieces of *A. arabica* were collected from the nearby villages of Sangareddy town. Then they were shade dried and powdered by using an electrical grinder and stored separately in air tight containers.



Image: Collected plant materials

PREPARATION OF EXTRACTS:

The three plant materials sample powders were soaked in the ethanol in 1:3 ratios separately for three days. Then the mixtures were filtered by using Whatman filter paper No.1. The crude extracts were diluted to 1% by using distilled water.



Image : Preparing for experimentation



Image : Prepared leaf extracts solutions

COLLECTION OF THE LARVAE:

The third instar larvae of *E. machaeralis* were collected from the teak plants available in the college campus. They have been reared for two days in the laboratory to adapt to the laboratory conditions. Food supply was stopped a day prior to the starting of the experiment.

10



Image : Rearing of the larvae

EXPERIMENTATION:

No-choice method was used for the experimentation. Fresh leaves of teak were collected, washed with tap water. The air-dried leaves were cut into discs of about 8 cm diameter (50 sq. cm). 3 leaf discs were sprayed with 1% crude extracts of *M. longifolia*, *A. Arabica* and *P. hystrophorus* separately. Control leaf was sprayed with ethanol. Then the leaf discs were placed in separate Petri dishes. A single pre-starved third instar larva of equal size was released on each disc and is allowed to feed on the leaf disc for 24

hours. The same experiment was replicated five times.



Image: Prepared Leaf discs

DATA COLLECTION:

After 24 hours of the each experiment, the larvae were removed from the leaf discs. The consumed area of the leaf discs was measured by using graph sheet method. Values obtained were recorded in the table.



Image: Collection of data

RESULTS

The obtained results are shown in the table 1. In the five experiments conducted, the third instar larva of *E. Machaeralis* consumed leaf discs treated with the extracts of *M. longifolia* were 4.48, 4.40, 4.56, 4.28 and 4.60 Sq. Cm respectively. The mean consumption of 5 days is 4.46 Sq.cm.

2.16, 1.96, 2.36, 1.88 and 2.24 sq. Cm of portions of the leaf discs treated with *A. Arabica* bark extracts were consumed by the larva in the five experiments respectively. The mean consumption is 2.12 Sq. Cm.

Leaf discs treated with *P. hysterothorus* leaf extracts were consumed by the larva in the five experiments are 3.48, 3.60, 3.32, 3.16 and 3.52 sq. Cm respectively. The mean consumption value is 3.41 Sq. Cm.

Table 1

S. No.	Plant extract	Day1	Day 2	Day 3	Day 4	Day 5	Mean	Antifeedant index
1	<i>Madhuca longifolia</i>	2.24 (4.48)	2.20 (4.40)	2.28 (4.56)	2.14 (4.28)	2.30 (4.60)	2.31 (4.46)	1.07
2	<i>Acacia arabica</i>	1.08 (2.16)	0.98 (1.96)	1.18 (2. 36)	0.94 (1.88)	1.12 (2.24)	1.06 (2.12)	38.01
3	<i>Parthenium hysterothorus</i>	1.74 (3.48)	1.80 (3.6)	1.66 (3.32)	1.58 (3.16)	1.76 (3.52)	1.70 (3.41)	16.25
4	Control	2.36 (4.72)	2.42 (4.84)	2.32 (4.64)	2.24 (4.48)	2.46 (4.92)	2.36 (4.72)	-

Percentage of leaf area consumption by *E. machaeralis*. Values in parenthesis represent leaf area consumption by *E. machaeralis* in square cm.

CALCULATION OF ANTIFEEDANT INDEX:

Antifeedant Index was calculated using the following formula.

$$AFI = C - T / C + T \times 100$$

Where: AFI = Antifeedant index

C = Area protected in controlled leaf disc.T

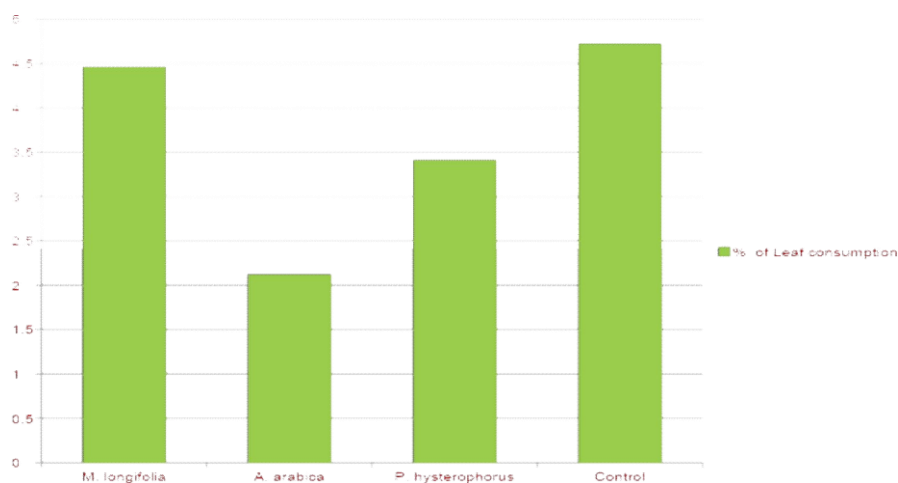
= Area protected in treated leaf disc.

As per the results obtained, the AntiFeedant Index (AFI) values of the extracts of *M.*

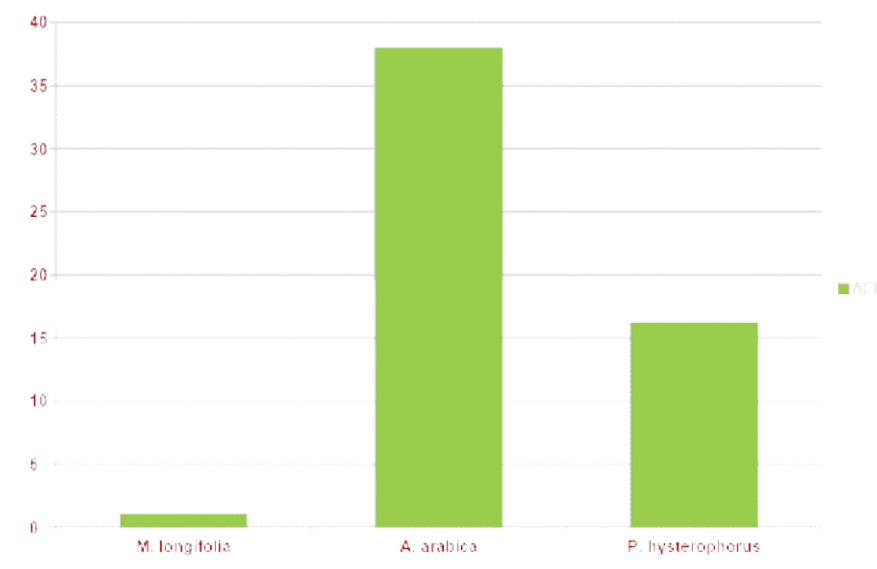
longifolia, *A. Arabica* and *P. hysterothorus* values are 1.07, 38.01 and 16.25 respectively.

ANALYSIS OF DATA

The below given bar diagrams were prepared from the obtained results to show the percentages of leaves consumption by the *E. Machaeralis* larvae and AFI (AntiFeedant Index) values of the tested phytochemicals.



Bar Diagram 1. % of control and test leaves consumption by *E. machaeralis*



Bar Diagram 2. AFI values of Tested phytochemicals

The results clearly indicate that bark extract of ***A. arabica*** is the most effective with 1.06% (2.12 Sq. Cm) of mean leaf consumption in minimizing the consumption of leaf as compared to control which showed 2.36 % (4.72 Sq. Cm) mean leaf consumption. Mean leaf consumption of the treated leaf discs with the extracts of ***M. longifolia*** and ***P. hysterothorus*** were 2.31% (4.46 Sq. Cm) and 1.70% (3.41 Sq. Cm) respectively.

Antifeedant Indices of crude extracts of ***A. arabica***, ***M. longifolia*** and ***P. hysterothorus*** were found to be 38.01, 1.07 and 16.25 respectively. Therefore, the obtained results prove that ***A. arabica*** is effective in minimizing the damage caused by *E. machaeralis*. There is no significant difference between the values obtained in control leaf discs and leaf discs treated with the extracts of ***M. longifolia*** leaves. Hence it indicates that *M. longifolia* leaf extracts are not at all useful in controlling the *E. machaeralis* larvae. Various phenol compounds present in ***A. arabica*** plant extracts could be the reason for this most effective antifeedant property.

FINDINGS

The following are the findings of the student study project.

1. With AFI value of 1.07, *Madhuca longifolia* leaf extracts stood in third position in terms of effectiveness out of the three tested phytochemicals. The *M. longifolia* leaf extracts are not at all effective in controlling the pest. Hence using *M. longifolia* leaf extracts for controlling the teak leaf skeletonizer is not advisable.
2. *Parthenium hysterophorus* leaf extracts AFI value was found to be 16.25. They exhibited very less effectiveness. So using the extracts of *P. hysterophorus* is not economical.
3. *Acacia arabica* bark extracts showed AFI value of 38.01. They are 38.01% effective in controlling the *E. machaeralis* when compared to control results.
4. 38.01% effectiveness may not appear to be a big thing. Only the crude extracts were used in the present study. Purified alkaloids may exhibit much more effectiveness. From the economical point of view, crudes extracts may be used in teak plantations against teak leaf skeletonizer during epidemic situations.

CONCLUSIONS **&** **SUGGESTIONS**

Based on the results obtained in the current study, it may be concluded that using *Madhuca longifolia* leaf extracts is not at all advisable for controlling the teak leaf skeletonizer as they were proven to be ineffective. Leaf extracts of *Parthenium hysterophorus* were discovered to be less effective. Hence, they are not suitable to use them against *E. machaeralis* from economical point of view. *Acacia arabica* bark extracts showed AFI value of 38.01. That means they prevent the damage by the larvae of *E. machaeralis* to almost 40%. As the *A. arabica* barks are easily available to the farmers, without spending any money, they can prepare crude extracts from the pieces of *A. arabica* bark and use them during the epidemic times.

A. arabica bark pieces are well known for their alkaloids content. They are being used in many industrial applications for a long time. What specific alkaloids or any other chemicals present in the bark extracts of *A. arabica* are responsible for this antifeedancy is not known. To know that further studies are required. For conducting these studies lot of funding may be required. But, when compared to the loss occurring in the form of low quantity and quality timber production in teak plantations due to *E. machaeralis*, the expenditure required for these studies would be very less.

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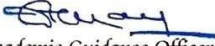



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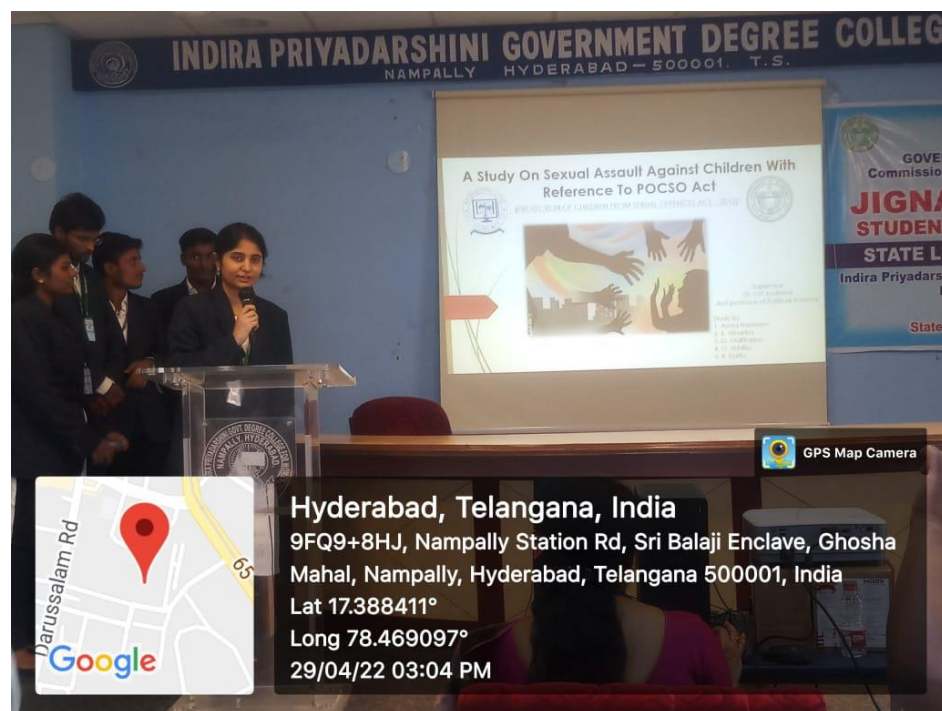
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Pravin Kumar

DEPARTMENT OF POLITICAL SCIENCE

Student Study Project: 2021-22

A student study project entitled "A Study on Sexual Assault Against Children with reference to POCSO act" was undertaken by the students of Department of Political Science under the guidance of Dr.Challoju Jyothsna, Asst.Professor of Political Science. Students participated in "Jignasa " student study project competitions, conducted by the commissioner ate of collegiate education and presented this project. This project won first prize at the District level and was selected for the state level presentation. Certificates were issued for the faculty and students





CERTIFICATES





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