

# **Final Report of work done on**

## **MINOR RESEARCH PROJECT**

Investigations on larvicidal effects of *Parthenium hysterophorus*  
against polyphagous pests *Spodoptera litura* and *Spodoptera*  
*littoralis*

*Submitted to*

**University Grant Commission**

(Under XII -Plan 2012-2017)

**Joint Secretary**

**Western Regional Office,  
University Grants Commission,  
Pune University Campus, PUNE-411 007**

By

**Dr. Yogesh Harishchandra Wasu**

M.Sc. M. Phil. Ph.D.

Assistant Professor

S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S.  
Commerce College, Shahada, Dist.– Nandurbar  
425409(MS)



**UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110 002**

**STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT**

1. Name of Principal Investigator: **Dr. Yogesh Harishchandra Wasu**

2. Department of PI: **Department of Zoology**

Name of College: **Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College, Shahada, District - Nandurbar (425409)**

3. UGC approval Letter No. and Date: **47-933/14 (WRO) Date: 20 Feb 2015**

4. Title of the Research Project: **Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagus pests *Spodoptera litura* and *Spodoptera littoralis***

5. Effective date of starting the project: **17<sup>th</sup> March 2015**

6. a. Period of Expenditure: From **17<sup>th</sup> March 2016 to 16<sup>th</sup> March 2017**

b. Details of Expenditure:

S. No.	Item	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
i.	Books & Journals	NIL	NIL
ii.	Equipment	NIL	NIL
iii.	Contingency including special needs	25000	25000
iv.	Field Work/Travel (Give details in the proforma).	10000	10000
v.	Hiring Services	NIL	NIL
vi.	Chemicals & Glassware	80000	NIL
	Total	115,000	

7. If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

8. It is certified that the grant of Rs 1,10,000/- (One Lakh Ten Thousands) was sanctioned from the University Grants Commission under the scheme of support for IIInd phase of Minor Research Project entitled **Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagus pests *Spodoptera litura* and *Spodoptera littoralis*** vide UGC letter No. F. **47-933/14 (WRO)** dated **20 Feb 2015** from this Rs 35, 000 (Thirty Five Thousands) has been utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

SIGNATURE OF PRINCIPAL INVESTIGATOR



PRINCIPAL  
Principal  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S. Comm. College, Shahada,  
Dist. Nandurbar (M.S.)

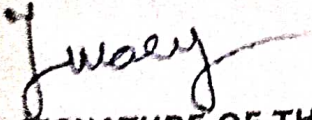


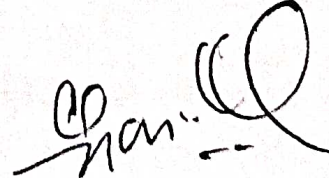
UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110 002

Annexure - V

Utilization certificate

Certified that the grant of Rs. 210,000 (Rupees Two lakh Ten Thousands only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagous pests *Spodoptera litura* and *Spodoptera littoralis* vide UGC letter No. F. 47-933/14 (WRO) dated 20 Feb 2015 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

  
SIGNATURE OF THE  
PRINCIPAL INVESTIGATOR

  
PRINCIPAL  
Acting Principal  
P. S. Mandal's

Science Commerce & S.J. Patil Arts College  
BHANADA (Dist. Nandurbar) M.S.

For P.D. DALAL & Co  
Chartered Accountants

  
(S.K. Deshpande)  
Partner  
M.No. 043603

STATUTORY AUDITOR  
23 MAY 2016  
(Seal)





UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002

SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL  
REPORT OF THE WORK DONE ON THE PROJECT

1. Title of the Project:

Investigations on larvicidal effects of *Parthenium hysterophorus* against  
polyphagus pests *Spodoptera litura* and *Spodoptera littoralis*

2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR:

**Dr. Yogesh Harishchandra Wasu**

**Department of Zoology**

Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College,  
Shahada, District – Nandurbar (425409)

3. NAME AND ADDRESS OF THE INSTITUTION:

Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College,  
Shahada, District – Nandurbar (425409)

4. UGC APPROVAL LETTER NO. AND DATE:

**47-933/14 (WRO) Date: 20 Feb 2015**

5. DATE OF IMPLEMENTATION:

**17<sup>th</sup> March 2015**

6. TENURE OF THE PROJECT:

**17<sup>th</sup> March 2015 to 16<sup>th</sup> March 2017**

7. TOTAL GRANT ALLOCATED:

**Rs. 3,25,000/- (Three Lakh Twenty five Thousands)**

8. TOTAL GRANT RECEIVED:

**Rs. 2,10,000/- (Two Lakh Ten Thousands)**

9. FINAL EXPENDITURE:

**Rs. 2,45,000/- (Two Lakh Forty five Thousands)**

10. TITLE OF THE PROJECT:

Investigations on larvicidal effects of *Parthenium hysterophorus* against  
polyphagus pests *Spodoptera litura* and *Spodoptera littoralis*

11. OBJECTIVES OF THE PROJECT:

(Attached Separately: Annexure 'a')

12. WHETHER OBJECTIVES WERE ACHIEVED:

Yes (Attached Separately: Annexure 'b')

13. ACHIEVEMENTS FROM THE PROJECT:

(Attached Separately: Annexure 'c')

14. SUMMARY OF THE FINDINGS:

(Attached Separately: Annexure 'd') (IN 500 WORDS)

15. CONTRIBUTION TO THE SOCIETY:

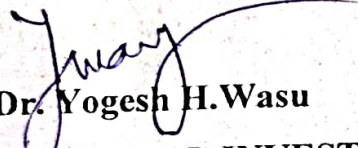
(Attached Separately: Annexure 'e')

16. WHETHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT

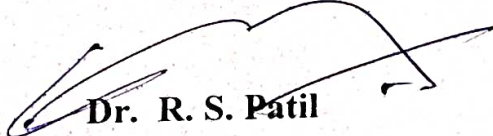
NO

17. NO. OF PUBLICATIONS OUT OF THE PROJECT:

ONE (Reprint Attached)

  
Dr. Yogesh H. Wasu  
(PRINCIPAL INVESTIGATOR)



  
Dr. R. S. Patil  
(PRINCIPAL)  
Principal  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V. & Comm. College, Shahada,  
Dist. Nandurbar (M.S.)



UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI – 110 002

ASSESSMENT CERTIFICATE

It is certified that the proposal entitled “Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagous pests *Spodoptera litura* and *Spodoptera littoralis*” by **Dr. Yogesh Harishchandra Wasu** Department of Zoology Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College, Shahada, District – Nandurbar (425409) has been assessed by the Institutional Expert committee consisting the following members for submission to the UGC Regional Office Western Regional Office, UGC Pune University Campus, PUNE-411 007 for financial support under the scheme of Minor Research Projects.

Details of Expert Committee:

- 1) Dr S K Tayde
- 2) Dr M K Patel
- 3) Dr R Z Sayyed

The proposal is as per the guidelines.

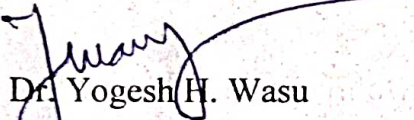


(PRINCIPAL)  
Principal  
(Seal)  
PSGVPMs S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)

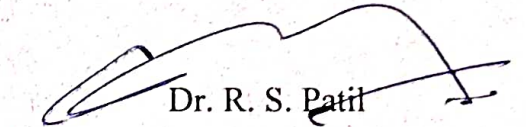
## ASSETS CERTIFICATE

It is certified that the following equipments purchased from Minor Research Project file number **47-933/14 (WRO)** has been handed over to the **Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College, Shahada.**

- 1) Digital Balance CA 223 Contech Make
- 2) Digital oven Stainless steel
- 3) Heating Mantle capacity 2 Ltr

  
Dr. Yogesh H. Wasu  
Principal Investigator

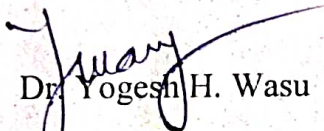



  
Dr. R. S. Patil  
Principal  
**Principal**  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)

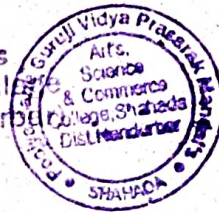


## ACCESSION CERTIFICATE

It is certified that the books purchased from Minor Research Project file number **47-933/14 (WRO)** has been handed over to the college central/ Departmental library of **Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College, Shahada**. Their accession number is from Z-134 to Z-155

  
Dr. Yogesh H. Wasu  
Principal Investigator

  
B. S. Patil  
Librarian  
**LIBRARIAN**  
P. S. G. V. P. Mandal's  
Arts, Sci. & Comm. Coll  
SHAHADA, (Dist. Nandurbar)

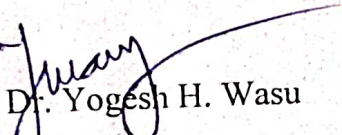


  
Dr. R. S. Patil  
Principal  
**Principal**  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)

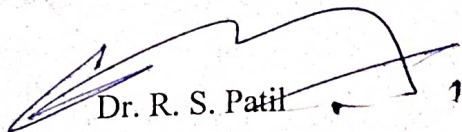


## PROJECT COMPLETION REPORT (PCR)

It is certified that the following UGC Minor Research Project file number **47-933/14** **(WRO)**, dated **20 Feb 2015** have been completed. Kindly find attached herewith the complete report of work done of the mentioned project.

  
Dr. Yogesh H. Wasu  
Principal Investigator



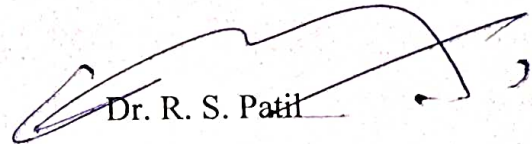
  
Dr. R. S. Patil  
Principal  
**Principal**  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)



## CERTIFICATE

It is certified that the following UGC Minor Research Project file number **47-933/14 (WRO)**, dated **20 Feb 2015** of Principal Investigator Dr. Yogesh H. Wasu has uploaded the executive summary of the project on the college website, the link is [www.psgvpasc.ac.in](http://www.psgvpasc.ac.in). This certificate is as per the requirement under Minor Research Project guidelines.



  
Dr. R. S. Patil

Principal  
**Principal**  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)



UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002

Annual Report of the work done on the Minor Research Project  
(Report to be submitted within 6 weeks after completion of each year)

1. **Project report No.** 2<sup>nd</sup> Annual Report
2. **UGC Reference No.** F. 47-933/14 (WRO) **dated** 20 Feb 2015
3. **Period of report:** from 17<sup>th</sup> March 2016 to 16<sup>th</sup> March 2017
4. **Title of research project:** Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagous pests *Spodoptera litura* and *Spodoptera littoralis*
5. (a) **Name of the Principal Investigator:** Dr. Yogesh Harishchandra Wasu  
(b) **Department:** Department of Zoology  
(c) **College where work has progressed:** Shri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. Commerce College, Shahada, District – Nandurbar (425409)
6. **Effective date of starting of the project:** 17<sup>th</sup> March 2015
7. **Grant approved and expenditure incurred during the period of the report:**
  - a. **Total amount approved:** Rs. 115,000 (Rupees One lakh fifteen Thousands only)
  - b. **Total expenditure:** Rs. 2,45,000 (Rupees Two lakh Forty Five Thousands only)
  - c. **Report of the work done:** (separate sheet attached as **Annexure A**)
    - i. **Brief objective of the project:**
    - ii. **Work done so far and results achieved and publications, if any, resulting from the work** (Give details of the papers and names of the journals in which it has been published or accepted for publication):
    - iii. **Has the progress been according to original plan of work and towards achieving the objective. if not, state reasons:**

iv. Please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to the concerned Regional Office of the UGC.

v. Any other information:

  
SIGNATURE OF THE PRINCIPAL INVESTIGATOR



  
PRINCIPAL  
(Seal)

Principal  
PSGVPM's S.I. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)



### 7.c. Report of the work done:

#### i. Brief objective of the project:

1. To prepare the crude extract of *P. hysterothorus* with different solvent systems.
2. To screen the crude extract against larvae of *S. litura* and *S. littoralis*.
3. To obtain different fractions and sub-fractions from active crude extract/s using column chromatography.
4. To screen the Larvicidal activity of fractions and sub-fraction.
5. To identify the most effective sub-fraction of *P. hysterothorus* for larvicidal activity.

#### ii. Work done so far, and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication):

Present Project work was conducted to achieve following targets:

##### 1. Collection and identification of test material:

a) Plant material: *Parthenium hysterothorus* plants were collected from Lonkheda Tal. Shahada, Dist. Nandurbar. It was identified and authenticated by Dr. Santosh K. Tayade Head, Dept. of Botany PSGVP Mandal's Shri S. I. Patil Arts, G. B. Patel Science & S. T. K. V. S. Commerce College Shahada.

b) Insects: For collection of *Spodoptera litura* and *Spodoptera littoralis* eggs and larvae were collected from crop fields of Dhadgaon Tehsil and Shahada Tehsil and sterilized with 0.02% sodium hypochloride solution, dried and allowed to hatch and third generation larvae were used. The culture was continuously maintained on castor bean leaves at room temperature ( $27 \pm 2^\circ \text{C}$ ),  $65 \pm 5\%$  RH and 12:12 L:D photo period in the laboratory for further experimentation.

##### 2. Extraction of crude extracts using different solvent systems:

Fresh leaves of identified *Parthenium hysterothorus* were collected, washed, shade dried and coarsely powdered. Known quantity of powdered leaves extracted with known quantity of Chloroform, ethyl acetate, methanol and water in soxhlet apparatus.

##### 3. Toxicity assay for crude extracts:



Different concentrations of crude extract of *P. hysterothorus* were screened for larvicidal activity against 4<sup>th</sup> instar larvae of *S. litura* and *S. littoralis* using leaf dip method and LC 50 & LC 90 values were determined (table 1) using Probit Analysis (Finney, 1947). For each experiment, 4<sup>th</sup> instar larvae were used for 48 hours of exposure with 5 replicates.

Table:1. LC 50 & LC 90 values for 72 hours of exposure of *P. hysterothorus* crude extracts using different solvents against *S. litura* and *S. littoralis*.

Sr. No.	Insect	Solvent of Extraction	LC 50 Value (% conc)	95% confidence limit		LC 90 Value (% conc)	95% confidence limit	
				Lower	Upper		Lower	Upper
1	Spodoptera littura	D. Water	7.96	4.92	9.20	11.28	9.59	13.60
2		Chloroform	8.18	6.17	10.11	14.92	12.98	16.34
3		Ethyl Acetate	9.26	8.20	11.05	16.14	15.20	17.10
4		Methanol	10.40	9.10	12.20	17.96	16.90	19.40
5	Spodoptera littoralis	D. Water	8.14	5.40	9.29	12.05	10.05	14.25
6		Chloroform	9.34	7.46	11.25	15.94	15.05	17.65
7		Ethyl Acetate	10.20	9.15	11.95	17.59	16.50	19.60
8		Methanol	12.05	10.14	13.55	19.24	18.55	22.50

Table 1 showed LC 50 & LC 90 values were least for aqueous extract of *P. hysterothorus* for both species of *Spodoptera*. Hence for further investigations aqueous extract was used for fractionation to obtain most active fraction.

#### 4. Fractionation and sub-fractionation of active crude extract:

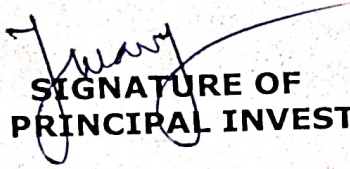
Aqueous crude extract was eluted through column using different solvents viz. chloroform, Ethyl acetate and Methanol to obtain fractionated extracts.




iii. Has the progress been according to original plan of work and towards achieving the objective. if not, state reasons: Yes

iv. Please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to the concerned Regional Office of the UGC: NA

v. Any other information: NA

  
SIGNATURE OF  
THE PRINCIPAL INVESTIGATOR



  
PRINCIPAL  
(Seal)  
Principal  
PSGVPM's S.L. Patil Arts, G.B. Patel Science  
& S.T.K.V.S Comm. College, Shahada,  
Dist. Nandurbar (M.S.)





## LARVICIDAL EFFECTS OF *PARTHENIUM HYSTEROPHORUS* AGAINST POLYPHAGUS PESTS *SPODOPTERA LITURA* AND *SPODOPTERA LITTORALIS*

Wasu Yogesh H.

Assistant Professor, Dept. of Zoology, S I Patil Arts, G B Patel Science and S T K V S Commerce College, Shahada, Dist. Nandurbar (425409)

Gawande Deepali M.\*

Assistant Professor, Dept. of Zoology, Science Senior College, Shahada, Dist. Nandurbar (425409) \*Corresponding Author

Patel Sagar B.

Research Scholar, Dept. of Zoology, S I Patil Arts, G B Patel Science and S T K V S Commerce College, Shahada, Dist. Nandurbar (425409)

### ABSTRACT

Though numbers of plants are screened for insecticidal properties, *P. hysterothorus* is not much explored. It is a nuisance plant weed which has adverse effects on growth and development of major cash crop and also hazardous to human well being and its eradication is mandatory. Thus in the present investigation, *P. hysterothorus* will be scientifically checked for its insecticidal potential to control *Spodoptera litura* and *Spodoptera littoralis* which are major pests for oil seed plants like soybean, a major cash crop in Nandurbar district with tribal population. The use of *P. hysterothorus* as an insecticide will automatically help in its eradication. Present investigation has been undertaken to screen the crude extract of *P. hysterothorus* with different solvent systems against larvae of *S. litura* and *S. littoralis*.

**KEYWORDS :** *Parthenium*; *Spodoptera litura*; *Spodoptera littoralis*; LC50.

### INTRODUCTION:

Over the centuries people have struggled to protect crops against invasion by pests and microbial pathogens. To overcome this problem of insect pests, numerous synthetic insecticides and pesticides are used in regular practice but pesticide resistance develops in insect and negative effects are reported on target and non-target organisms including human being and environment<sup>[1]</sup>. One possible way to reduce all these death-defying effects of synthetic insecticides and pesticides is to use plant derived insecticides which are more eco-friendly and medically safe<sup>[2]</sup>. Botanical products are one of the most prominent alternatives for pest control in current and future requirements<sup>[3]</sup>. Several plant extracts have been evaluated for their activity against important agricultural pests for a few decades in different countries<sup>[4]</sup> but only few have been reached up-to field trials and commercialization.

Now a day researchers turned toward the botanicals as the chemical pesticides resulted in evolution of the pesticide resistance for several pests. More than 2000 species of plants are known to possess some insecticidal activity. Due to these reasons number of researchers are orienting towards the evaluation of toxicity of secondary metabolite of plants; like phenols, alkaloids, glucosinolates, cyanogenic glycosides and saponins<sup>[5]</sup>. Various studies of different plant species extracts were performed on different insect pests, still their applications are not known to the farmers<sup>[6]</sup>.

In Present study has been undertaken to screen the crude extract of *P. hysterothorus* with different solvent systems against larvae of *S. litura* and *S. littoralis* to obtain a sustainable alternative to the synthetic insecticide.

### MATERIALS AND METHODS:

1. Plant material: *Parthenium hysterothorus* plants were collected from local area. It was identified and authenticated by Dept. of

Botany of our institute.

2. Insects: For collection of *Spodoptera litura* and *Spodoptera littoralis* eggs and larvae were collected from crop fields of Dhadgaon and Shahada Tehsil and sterilized with 0.02% sodium hypochloride solution, dried and allowed to hatch and third generation larvae were used. The culture was continuously maintained on castor bean leaves at room temperature ( $27 \pm 2^\circ\text{C}$ ),  $65 \pm 5\%$  RH and 12:12 L:D photo period in the laboratory for further experimentation.
3. Extraction of crude extracts using different solvent systems: Fresh leaves of identified *Parthenium hysterothorus* were collected, washed, shade dried and coarsely powdered. Known quantity of powdered leaves extracted with known quantity of Chloroform, ethyl acetate, methanol and water in soxhlet apparatus.
4. Toxicity assay for crude extracts: Different concentrations of crude extract of *P. hysterothorus* were screened for larvicidal activity against 4<sup>th</sup> instar larvae of *S. litura* and *S. littoralis* using leaf dip method and LC 50 & LC 90 values were determined using Probit Analysis method of Finney<sup>[7]</sup>. For each experiment, 4<sup>th</sup> instar larvae were used for 48 hours of exposure with 5 replicates.

### RESULTS:

Present investigation showed that LC 50 values & LC 90 values for different solvent extracts of *P. hysterothorus* for both species of *Spodoptera*. It is observed that aqueous extracts of *P. hysterothorus* LC 50 values i.e 7.96 and 8.18 for 72 hours of exposure were least as compared to Chloroform, Ethyl Acetate and Methanol for *S. litura* and *S. littoralis* respectively. Similarly LC 90 values i.e 11.28 and 12.05 were also found least for 72 hours of exposure to aqueous extract as compared to other solvents used for preparation of crude extracts. It was also observed aqueous extracts of *P. hysterothorus* would be helpful to control these polyphagous pests.

**LC 50 & LC 90 values for 72 hours of exposure of *P. hysterothorus* crude extracts using different solvents against *S. litura* and *S. littoralis***

Sr. No.	Insect	Solvent of Extraction	LC 50 Value (% conc)	95% confidence limit		LC 90 Value (% conc)	95% confidence limit	
				Lower	Upper		Lower	Upper
1	<i>Spodoptera litura</i>	D. Water	7.96	4.92	9.20	11.28	9.59	13.60
2		Chloroform	8.18	6.17	10.11	14.92	12.98	16.34
3		Ethyl Acetate	9.26	8.20	11.05	16.14	15.20	17.10
4		Methanol	10.40	9.10	12.20	17.96	16.90	19.40
5	<i>Spodoptera littoralis</i>	D. Water	8.14	5.40	9.29	12.05	10.05	14.25
6		Chloroform	9.34	7.46	11.25	15.94	15.05	17.65
7		Ethyl Acetate	10.20	9.15	11.95	17.59	16.50	19.60
8		Methanol	12.05	10.14	13.55	19.24	18.55	22.50



**DISCUSSION:**

Finding of the study reveals that LC 50 & LC 90 values for 72 hours of exposure were least for aqueous extract of *P. hysterophorus* exposed to both species of *Spodoptera*. Hence aqueous extract of *P. hysterophorus* could be helpful to control these polyphagous pests. These findings are similar to our previous<sup>[8, 9]</sup> findings where Fall Army worms were exposed to aqueous extract of Parthenium. Similarly Datta and Saxena<sup>[10]</sup> found Parthenium hysterophorus is helpful to control insect pest. Their study revealed that lactone was found to be about 2.25 times more active than parthenin against sixth-instar larvae of *Spodoptera litura* and pyrazoline adduct was found to be the most effective as an insecticide against the adults of store grain pest *Callosobruchus maculatus*.

Many studies<sup>[11,12,13]</sup> suggests *P. hysterophorus* can be used for their insecticidal properties hence need to encourage the research on the utilization potential of this weed and to evaluate its efficacy as insecticide in near future.

**CONCLUSION & SUMMARY:**

In present investigation, *P. hysterophorus* was scientifically checked for its insecticidal potential and showed values of LC 50 & LC 90 for aqueous extract on 72 hours of exposure to *Spodoptera litura* and *Spodoptera littoralis* were least. Both *Spodoptera* species are major pests for oil seed plants like soybean, a main cash crop in Nandurbar district with tribal population of Maharashtra. Thus use of *P. hysterophorus* as an insecticide will automatically help in eradication of this invasive weed from crop land.

**ACKNOWLEDGMENT:**

Authors are thankful to UGC (WRO) for providing financial assistance to present work.

**REFERENCES:**

1. K. M. Remia, S. Lowgaswamy, "Larvicidal efficacy of leaf extract of two botanicals against mosquito vector *Aedes aegypti* (Diptera: Culicidae)". Indian J Nat products & Resources Vol. 1(2), pp. 208-10, 2010.
2. F. E. Dayan, C. L. Cantrell, and S. O. Duke, "Natural products in crop protection", Bioorgan Med Chem, Vol. 17, pp. 4022-34, 2009.
3. National Research Council. 2000. The future role of pesticides in US agriculture. Committee on the future role of pesticides in US Agriculture, BANRBFST, Commission on life sciences. National academy of sciences, Washington, DC. pp. 301.
4. B. Vasakorn, W. Eric, A. Pascaline, and F. Ren'e, "Antifeedant activity of *Jatropha gossypifolia* and *Melha azedarach* senescent leaf extracts on *Spodoptera frugiperda* (Lepidoptera: Noctuidae) and their potential use as synergists". Pest Manag Sci Vol. 68, 1255-64, 2012.
5. M. S. Tagliari, N. Knaak, and L. M. Fiuza, "Plantas inseticidas: interações e compostos", Pesquisa Agropecuaria Gaúcha, Vol. 10, pp. 101-11, 2004.
6. C. Ulrichs, I. Mewis, S. Adhikary, A. Bhattacharyya, and A. Goswami, "Antifeedant activity and toxicity of leaf extracts from *Porteresia coarctata* Takeoka and their Vectors on the physiology of *Spodoptera litura* (F)", J. Pest Sciences, Vol. 81, pp. 79-84, 2008.
7. D. J. Finney, "The estimation from individual records of the relationship between dose and quantal response", Biometrika, Vol. 34, pp. 320-34, 1947.
8. D. M. Gawande, Y. H. Wasu, and I. A. Raja, "Plant derived toxicants to control castor semilooper, *Achaea janata* (Noctuidae: Lepidoptera)" Asian J. Biol. & Biotechnol, Vol. 2(2) pp. e-214.
9. Y. H. Wasu, D. M. Gawande, and S. P. Patil, "Plant Weeds Parthenium hysterophorus and *Ageratina adenophora* for Fall Armyworm Control", Int. J. of Life Sciences, Vol. 1 (1), pp. 71-75, 2013.
10. S. Datta, and D. B. Saxena, "Pesticidal properties of parthenin (from Parthenium hysterophorus) and related compounds", Pest Management Science, Vol. 57, pp. 95-101, 2001.
11. I. Morin, A. M. Reid, N. M. Sims-Chilton, Y. M. Buckley, K. Dhileepan, G. T. Hastwell, T. L. Nordblom, and S. Raghu, "Review of approaches to evaluate the effectiveness of weed biological control agents", Biol. Control Vol. 5 pp. 1-15, 2009.
12. A. I. Maishi, P. K. S. Ali, S. A. Chaghtai, and G. Khan, "A proving of Parthenium hysterophorus, L.", Brit Homoeopath J Vol. 87, pp. 17-21, 1998.
13. A. Bagchi, A. Raha, and P. Mukherjee, "A complete review on Parthenium hysterophorus linn.", Int. J Recent Adv Pharmaceutical Res., Vol. 6(1), pp. 42-49, 2016.