Final Report of work done on

MINOR RESEARCH PROJECT

Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagus 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)

Annexure - III

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: **17th March 2015**
6. a. Period of Expenditure: From **17th March 2016**to **16th 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 IInd phase of Minor Research Project entitled **Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagus pests *Spodoptera liturа*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

Pooya Sane Guruji Vidya Prasarak Mandal's Arts, Science & Commerce College, Shahada Dist. Nandurbar SHAHADA

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

Annexure – V

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

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 polyphagus 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.

For P.D.DALAL & Co
Chartered Accountants

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

STATUTORY AUDITOR

23 MAY 2016

(Seal)

SIGNATURE OF THE
PRINCIPAL INVESTIGATOR

PRINCIPAL
Acting Principal
P.(Seal)P. Mandal's
Science Commerce & S.I.Patil Arts College
SHAHADA (Dist.Nandurbar)M.S

P. D. DALAL & CO. ★ Chartered Accountants ★ DHULE

Annexure – VII

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

SUBMISSION OF INFORMATION AT THE TIME OF SENDING THEFINAL 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. CommerceCollege, 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. CommerceCollege, Shahada, District – Nandurbar (425409)

4. UGC APPROVAL LETTER NO. AND DATE:

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

5. DATE OF IMPLEMENTATION:

17th March 2015

6. TENURE OF THE PROJECT:

17th March 2015to **16th 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)
(Seal)

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

Poojya Sane Guruji Vidya Prasarak Mandal's Arts, Science & Commerce College, Shahada, Dist. Nandurbar

Annexure – VIII

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 polyphaguspests *Spodoptera litura*and *Spodoptera littoralis***"by**Dr. Yogesh Harishchandra Wasu**Department of **ZoologyShri S.I. Patil Arts, G. B. Patel Science and S. T. K. V. S. CommerceCollege, Shahada, District – Nandurbar (425409)**has been assessed by the**Institutional Expert** committee consisting thefollowing members for submission to the UGC Regional Office**Western Regional Office**, UGC Pune University Campus, PUNE-411 007 for financial support underthe 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)

(Seal)

Principal
PSGVPM's 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. CommerceCollege, 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. CommerceCollege, 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. College,
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.T.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.Thiscertificate 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.)

Sane Guruji Vidya Prasarak Mandal's
Arts, Science & Commerce College, Shahada Dist.Nandurbar
SHAHADA

Annexure –VI

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.** 2nd Annual Report
2. **UGC Reference No.F.** 47-933/14 (WRO) **dated** 20 Feb 2015
3. **Period of report: from** 17th March 2016 **to** 16th March 2017
4. **Title of research project:** Investigations on larvicidal effects of *Parthenium hysterophorus* against polyphagus 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:** 17th 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, resultingfrom the work (Give details of the papers and names of the journals inwhich it has been published or accepted for publication):

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

iv. Please enclose a summary of the findings of the study. One bound copy of thefinal report of work done may also be sent to the concernedRegional Office of theUGC.

v. Any other information:

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL
(Seal)

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

Annexure: A

7.c. Report of the work done:

i. Brief objective of the project:

1. To prepare the crude extract of *P. hysterophorus* 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.hysterophorus* for larvicidal activity.

ii. Work done so far, and results achieved and publications, if any, resultingfrom the work (Give details of the papers and names of the journals inwhich 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 hysterophorus*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 andthird generation larvae were used. The culture was continuously maintained on castor bean leaves at room temperature (27 ± 2° C), 65 ± 5% RH and 12:12 L:D photo period in the laboratoryfor further experimentation.
2. Extraction of crude extracts using different solvent systems:
   Fresh leaves of identified *Parthenium hysterophorus* werecollected, 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. hysterophorus*were screened for larvicidal activity against 4th instar larvae of *S. litura* and *S. littorallis* using leaf deep method and LC 50 & LC 90 valueswere determined (table 1) using Probit Analysis (Finney, 1947). For each experiment, 4th 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. hysterophrus crude extracts using different solvents against S. littura 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 littorallis	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. hysterophorus 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 obtained fractioned extracts.

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

iv. Please enclose a summary of the findings of the study. One bound copy of thefinal report of work done may also be sent to the concernedRegional Office of theUGC: NA

v. Any other information: NA

SIGNATURE OF
THE PRINCIPAL INVESTIGATOR

PRINCIPAL
(Seal)

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

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Original Research Paper

Entomology

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. hysterophorus* 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. hysterophorus* 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. hysterophorus* as an insecticide will automatically help in its eradication. Present investigation has been undertaken to screen the crude extract of *P. hysterophorus* 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[1]. 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 [2]. Botanical products are one of the most prominent alternatives for pest control in current and future requirements [3]. Several plant extracts have been evaluated for their activity against important agricultural pests for a few decades in different countries [4] 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 [5]. Various studies of different plant species extracts were performed on different insect pests, still their applications are not known to the farmers [6].

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

MATERIALS AND METHODS:

1. Plant material: *Parthenium hysterophorus* 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 ± 2° C), 65 ± 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 hysterophorus* 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. hysterophorus* were screened for larvicidal activity against 4th instar larvae of *S. litura* and *S. littorallis* using leaf deep method and LC 50 & LC 90 values were determined using Probit Analysis method of Finney[7]. For each experiment, 4th 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. hysterophorus* for both species of *Spodoptera*. It is observed that aqueous extracts of *P. hysterophorus* LC 50 values i.e 7.96 and 8.18 for 72 hours of exposure were least as compared to Chloroform, Ethyl Acetae and Methanol for S. littua 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. hysterophorus* would be helpful to control these polyphagus pests.

LC 50 & LC 90 values for 72 hours of exposure of *P. hysterophrus* crude extracts using different solvents against *S. littura* 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 littorallis*	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

DISCUSION:

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 polyphagus pests. These finding are similar to our previous [8, 9] findings where Fall Army worms were exposed to aqueous extract of Parthenium. Similarly Datta and Saxena[10] 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 maculates*.

Many studies [11,12,13] 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.

AKNOWLEDEGMENT:

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

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