



## ALLELOPATHIC POTENTIAL OF SELECTED INVASIVE ALIEN PLANT SPECIES (IAPS) OF NEPAL AS BIO-HERBICIDE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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### SUPPLEMENTRY

**Table S1.** Search Strategies

<b>PubMed - run 25/10/2024</b> "Allelopathic effect Chromolena" OR Pontederia OR Mikania OR Lantana OR "Sphagneticola"herbicidal potential"
<b>AGORA - run 25/10/2024</b> "Allelopathic effect Chromolena OR pontederia OR mikania OR Lantana OR Sphagneticola "herbicidal potential"
<b>Google Scholar - run 25/10/2024</b> "Allelopathic effect Chromolena OR pontederia OR mikania OR Lantana OR Sphagneticola "herbicidal potential"
<b>EBOSCO - run 25/10/2024</b> "Allelopathic effect Chromolena OR pontederia OR mikania OR Lantana OR Sphagneticola "herbicidal potential"
<b>ProQuest - run 25/10/2024</b> "Allelopathic effect Chromolena OR pontederia OR mikania OR Lantana OR Sphagneticola "herbicidal potential"

**Table S2.** Data collected from the study

Ref. Id	Year	Author	IAPs-sp	Test sp	Formulation	Concentration	Time	Experimental environment
Study 1	2020	Carrubba et al.	<i>Lantana camara</i>	Weeds	Aquadest	6.16%	143 days	Semi-natural
Study 2	2024	Uyun et al.	<i>Sphagneticola trilobata</i>	<i>Cyperus rotundus</i>	Aquadest	40%	40 days	Control-Gh
Study 3	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Euphorbia helioscopia</i>	Hexane extract	100%	15 days	Control
Study 4	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Chenopodium album</i>	Hexane extract	100%	15 days	Control
Study 5	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Avena fatuca</i>	Hexane extract	100%	15 days	Control
Study 6	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Rumex dentatus</i>	Hexane extract	100%	15 days	Control
Study 7	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Phalaris minor</i>	Hexane extract	100%	15 days	Control
Study 8	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Euphorbia helioscopia</i>	Hexane extract	100%	15 days	Control
Study 9	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Chenopodium album</i>	Hexane extract	100%	15 days	Control
Study 10	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Avena fatuca</i>	Hexane extract	100%	15 days	Control
Study 11	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Rumex dentatus</i>	Hexane extract	100%	15 days	Control
Study 12	2021	Anwar & Qureshi	<i>Lantana camara</i>	<i>Phalaris minor</i>	Hexane extract	100%	15 days	Control
Study 13	2020	Fu et al.	<i>Pontederia crassipes</i>	<i>Cyperus esculentus</i>	Powder	1 g	39 days	Control-Gh

Study 14	20	Fu et al	<i>Pontederia crassipes</i>	<i>Amaranthus tricolor</i>	Powder	1 g	39 days	Control-Gh
Study 15	20	Fu et al	<i>Pontederia crassipes</i>	<i>Ambrosia artemisiifolia</i>	Powder	1 g	39 days	Control-Gh
Study 16	20	Fu et al	<i>Pontederia crassipes</i>	<i>Cyperus esculentus</i>	Aqueous extract	1:100/ 5 ml	7 days	Control-pp
Study 17	20	Fu et al	<i>Pontederia crassipes</i>	<i>Amaranthus tricolor</i>	Aqueous extract	1:100/5 ml	7 days	Control-pp
Study 18	20	Fu et al	<i>Pontederia crassipes</i>	<i>Ambrosia artemisiifolia</i>	Aqueous extract	1:100/5 ml	7 days	Control-pp
Study 19	20	Ranwala et al.	<i>Lantana camara</i>	<i>Ludwigia decurrens</i>	Aqueous extract	1:05	19 days	Control-pp
Study 20	20	Ranwala et al.	<i>Lantana camara</i>	<i>Ludwigia hysopifolia</i>	Aqueous extract	1:05	19 days	Control -pp
Study 21	20	Ranwala et al.	<i>Lantana camara</i>	<i>Ludwigia decurrens</i>	Powder	4 g	22 days	Control-Gh
Study 22	20	Ranwala et al.	<i>Lantana camara</i>	<i>Ludwigia decurrens</i>	Powder	4 g	22 days	Control-Gh
Study 23	20	Ranwala et al.	<i>Lantana camara</i>	<i>Ludwigia decurrens</i>	Powder	120 g	6 week	Natural
Study 24	20	Gindri et al	<i>Lantana camara</i>	<i>Bidens pilosa</i>	Aqueous extract	5%	7 days	Control
Study 25	20	Gindri et al	<i>Lantana camara</i>	<i>Bidens pilosa</i>	Aqueous extract	5%	7 days	Control
Study 26	20	Erida et al	<i>Chromolena odorata</i>	<i>Amaranthus spinosus</i>	Methanol extract		21 days	Semi-natural
Study 27	20	Alridiwirsah et al.	<i>Mikania micrantha</i>	<i>barnyard grass</i>	Ethanol	100%	42 days	Semi-natural
Study 28	20	Poonpaiboonpi pat et al.	<i>Chromolena odorata</i>	<i>Echinochloa</i>	Ethanol	8000ppm	7 days	Control-pp
Study 29	20	Poonpaiboonpi pat et al.	<i>Chromolena odorata</i>	<i>Amaranthus viridis</i>	Ethanol	8000ppm	7 days	Control-pp
Study 30	20	Poonpaiboonpi pat et al.	<i>Chromolena odorata</i>	<i>Echinochloa</i>	Crude hexane	4000	7 days	Control-pp
Study 31	20	Poonpaiboonpi pat et al.	<i>Chromolena odorata</i>	<i>Amaranthus</i>	Crude hexane	4000	7 days	Control-pp
Study 32	20	Dai et al.	<i>Sphagneticola-trilobata</i>	<i>Eupatorium catarium</i>	Aqueous extract	0.05 g/l	7 days	Control
Study 33	20	Ullah et al.	<i>Sphagneticola-trilobata</i>	<i>Wedelia chinensis</i>	Leachate	100%	50 days	Semi-natural
Study 34	20	Daba et al	<i>Lantana camara</i>	<i>G. parviflora</i>	Essential oil	5%	14 days	Semi-natural
Study 35	20	Lim et al	<i>Mikania micrantha</i>	<i>Echinochloa colona</i>	Methanol extract	5 g	7 days	Control-pp

“Control-pp =control petriplate bioassay” “Control-Gh =control at Greenhouse

**Table S3.** PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	Line 1, Page 1
<b>ABSTRACT</b>			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Line 8-32, Page 1
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Line 41-60, Page 2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Line 67-70, Page 2-3
<b>METHODS</b>			

Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Line 75-97, Page 3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Line 98-102
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Line 462-482 (Appendix 1), Page 17
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Line 103-109, Page 4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Line 110-115, Page 4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Line 120-123, 127 Page 4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Line 124-126, Page 4
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Line 128, Page 4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Line 131-133, Page 4
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Line 121-123, Page 4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Line 136-137, Page 5
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Line 133-134, Page 4
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Line 138- 139 Page 5
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	-
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	-
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Line 140, page 5
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Line 133, Page 4

**RESULTS**

Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Line 142-145, Page 5
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1 PRISMA Flowchart and Supplementary material-excluded studies
Study characteristics	17	Cite each included study and present its characteristics.	Supplimentary materials (Raw data for meta-analysis)
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Risk of bias graph Page 5, Line 130
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 1,2,3, 4 and fig 2 (A,B) and Fig 3(A, B)
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Line 146-226, Page 5,6,7
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Line 228-278, Page 8,9, 10
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	“
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	-
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	The funnel plots (Fig 2, 3) below each effect.
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Line 228-278, Page 8,9, 10
<b>DISCUSSION</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Line 287-306, Page 11,12
	23b	Discuss any limitations of the evidence included in the review.	Line 307-310, Page 12
	23c	Discuss any limitations of the review processes used.	Line 311-313, Page 12
	23d	Discuss implications of the results for practice, policy, and future research.	Line 326-340, Page 13
<b>OTHER INFORMATION</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Line 343, page 13
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	“

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	24c	Describe and explain any amendments to information provided at registration or in the protocol.	“
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Line 344, page 13
Competing interests	26	Declare any competing interests of review authors.	Line 347, page 13
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Appendix 1 & 2, at the last of review and supplementary materials as provided.

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*From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71. This work is licensed under CC BY 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>