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Distribution and Spread of Parthenium Weed (*Parthenium hysterophorus* L.) Infestation in Western Oromiya, Ethiopia



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Abstract

Parthenium hysterophorus is believed to be introduced to Ethiopia through East Hararge/Jigjig/Dire Dhawa, since then this alien weed is well established and started to spread and infest to other parts of the country. Up to know there is no report/articles published on the distribution and spread of Parthenium weed to Western part of Oromiya, Ethiopia particularly Wallaga Zones. A survey was conducted to assess the distribution and status of parthenium (*P. hysterophorus*) weed in four Wallaga Zones of Western Oromiya, namely East, West Horo Guduru and Qellam Wallaga zones in year 2016. The result of the survey revealed that a total of 34 out of 55 Districts were at high risk of parthenium infestation and 0.088% (3886 hectare) of productive land of Western Oromiya is under parthenium weed infestation. Hence, this needs the intervention of governments and non-governmental organization to tackle integrated weed management on the problem caused by alien weed, *P. hysterophorus* in West Oromiya to reduce its impact on livelihood of the farmers and to reduce its infestation. . This study revealed that *P. hysterophorus* has become a major pest plant of the wasteland, road sides, wet lands, vacant sites and crop fields and it has the potential to spread all over the zones. Hence it has a significant effect on the economic development of the study area. Integration of different control methods are therefore needed to prevent and control the danger of *P. hysterophorus* before it become out of the control in western Oromiya.

Keywords: Agricultural land; Pasture land; *Parthenium hysterophorus*; West oromiya

Introduction

Parthenium hysterophorus L. (Asteraceae) is an annual herb, woody, aggressive invasive alien weed sp. [1] that is native to America and now spread rapidly and extensively throughout the world [2]. [3] reported the occurrence of parthenium in different countries of Africa; Ethiopia, South Africa, Kenya, Mozambique, Zimbabwe and Madagascar; Asia, India, China, Vietnam and Australia [4]. Because of its distribution and adverse side effects on the ecosystem, it is regarded as one of the top ten worst weed [5]. In Ethiopia, Parthenium was first reported in 1968 from Dire-Dawa in Hararge, Eastern Oromiya. It was introduced to the area during the Ethio-Somalia war of 1976/77 by army vehicles [6]. Its infestation was also reported from Desse, Wallo, and North-Eastern parts of the country. Since then its area coverage is enormously increasing across agro climatic zones of the country. However, *P. hysterophorus* have many adverse impacts on agriculture including grazing land, cereal-based agriculture and other crop lands [6]. Due to the invasive capacity [7], allelopathic effects on other plants [8,9] strong competitiveness with crops [6] and health hazards to humans & animals [10-12]

of *P. hysterophorus* natural ecosystems are disrupted [2] as a result of this loss of plant biodiversity [12]; [13] will occur. It was reported that Parthenium caused yield reduction by 40-97% in sorghum if the weed was left uncontrolled throughout the season [6] and up to 90% in forage production in grasslands [14]. Apart from their threat to biodiversity and ecosystem services, invasive species have significant socio-economic impacts. The weed can affect crop production, animal husbandry, human health and biodiversity [2].

Even though invasive species, particularly parthenium weed, are causing severe damage to the environment in Ethiopia, there is not much documented information about this weed especially in western part of the country. It was assumed in the past no parthenium weed infestation in the western part of Ethiopian in general but western Oromiya in particular. However, recently experts and farmers are reporting the existence of this weed in different zones of Wollega in western Oromiya. Despite the presence of *P. hysterophorus* in Ethiopia for years, few comprehensive surveys of distribution of this weed have

been undertaken even that is restricted to Eastern, Northern and Southern Ethiopia and no data on the distribution and its spread in Western Oromiya had been collected prior to this study. Therefore, the main objective of this survey is to record the current distribution of *P. hysterophorus* in Western Oromiya.

Materials and Methods

Description of the study area

The study was conducted in four zones of Wallaga located in the western part of Oromiya regional state. These zones include Qellam, West, East and Horo Guduru Wallaga. Survey of *P. hysterophorus* was carried on all Districts of Western Oromiya, during the rainy season of May-July 2014. In each Districts information's were also taken from Agricultural office to record the distribution and spread of parthenium Weed on pasture lands, roadsides and/or others and crop field.

Table 1: Land Use Categories of the Four Wallaga Zones of Western Oromiya, 2014.

Zones	Agricultural Land (Hectare)	Forest Cover (Hectare)	Pasture Land (Hectare)	Coffee Plantation (Hectare)	Others (Hectares)	Total Area (Hectare)
East Wallaga	849,565	106,845	142,781	-	216,704	1,315,895
Horo Guduru Wallaga	364,241.97	106,580	138,393.48	-	102,951	712,166.22
Qellam Wallaga	406,144.8	166,383.09	43,526.9	-	370,722	986,777
West Wallagawollaga	625,791	122,965	122,968	110,813.5	436,329	1,418,866.7
Total (Hectare)	2,245,743	502,773	447,669	110,813.5	1,126,706	4,433,705

Source: Zonal Agricultural Office, 2014.

Data Analysis: All data is summarized using excel Microsoft office 2010 for better description and illustrations.



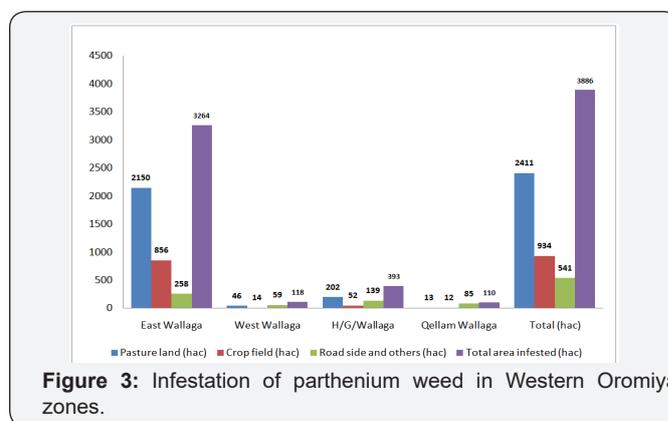
Figure 1: *P. hysterophorus* infestation at Najjo adjacent to crop field, Western Wallaga



Figure 2: *P. hysterophorus* infestation at Sire, Sire Woreda on forest field, Eastern Wallaga.

Results and Discussion

The current result of this survey indicated that about 0.088% (3,886 hectares) of land was invaded and at risk of invasion of *P. hysterophorus* of the western Oromiya land (Table 1). The weed has infested 34 districts out of the total districts (55 (61.8%)) of west Oromiya. Accordingly the data obtained from simple survey research *P. hysterophorus* is considered as a major threat to agricultural production in west Oromiya zones (Table 2) because the weed has well established in many districts of western Oromiya (Figure 1 & 2). The current survey obviously showed that *P. hysterophorus* has invaded croplands, forest land, road sides and grazing lands resulting in serious Parthenium seed bank at the observed sites in western Oromiya. The invasion of agricultural and pasture lands by parthenium weed directly reflects that it would affects crop and animal production of all zone.



In one Zone (East Wallaga) alone about 3264 hectares (0.25%) of land has been infested with Parthenium weed. However, the weed growth, developments, population density and distribution vary from districts to districts and Zone to Zone. Irrespective of its variation among Districts and Zone parthenium weed is spreading at an alarming rate to pasture 0.54% (2411 hectares of land), along road side & others (541 hectares) and agricultural lands 0.041% (934 hectares) and causing a serious damage to agricultural production in west Oromiya (Table 2 & Figure 3).

Horo Guduru Wallaga is other Wallaga Zone known in the region by its agricultural potential, however recently there

is a report on the declining of agriculture due to many factors such as; land degradation, population pressure, land shortage and fragmentation, unreliable climatic conditions, spread of introduced exotic weeds such as *Raphanus raphanistrum* ('Gommane' in Afaan Oromo), *Parthenium hysterophorus* ('Faramsisaa' in Afaan Oromo) and striga, a parasitic weed, severely competing with crops and highly reducing crop

production and productivity. In this zone 0.055% (393 hectares) of land was under parthenium weed infestation together with other biological and physical factors threatening agriculture in the zone (Table 2). As indicated in Table 2, 0.146% (202 hectare), 0.014% (52 hectares) of pasture and agricultural land was infested by this exotic weed, respectively.

Table 2: Parthenium Weed Distribution and Infestation in West Oromiya (Wallaga Zones), Ethiopia, 2014.

Zone	Total Districts	Infested Districts	Pasture Land (Hectares)	Agricultural Land (Hectares)	Road Side And Others (Hectares)	Total Area (Hectares)
East Wallaga	17	15	2150	856	258	3264
H/G/Wallaga	9	3	202	52	139	393
Qellam Wallaga	10	6	13	12	85	110
West Wallaga	19	10	46	14	59	118
Total (hectares)	55	34	2411	934	541	3,886

In West Wallaga agricultural and pasture land was reduced by 0.002% (14 hectares) and 0.04% (46 hectares) respectively and road side & others by 0.013% (59 hectares) (Figure 1). Whereas, in Qellam Wallaga agricultural land was reduced by 0.003% (12 hectares), pasture land by 0.03% (5 hectares) and road side & others by 0.023% (85 hectares) (Table 2 and Figure 3). Currently, the weed is expanding at very fast and is prevalent down from Finfinne/Addis to Qellam Wallaga, mainly along road side in urban and semi-urban areas. The farmers in west Oromiya call this weed as "Faramsisaa" in Afaan Oromo. Many farmers tell us that parthenium weed have many side effect on human and animal health, environment, biodiversity of the natural existence of the area (development of asthma, skin irritation, bad animal milk smells, loss of biodiversity & etc). In previous report by [15] the productivity of forage is reduced by 90% and the weed make lands infertile and weakens the quality of grazing land, animal health, meat and milk products, agricultural production in areas where the weed occurs.

It also poses a serious threat to the environment and biodiversity owing to its high invasion and allelopathic effect which has the capacity to rapidly replace the native vegetation [6]. Other study conducted in Jigjiga rangeland by [16] tells the increasing of parthenium weed invasion led to a decline in composition of native pasture species. Due to its aggressiveness it could affect other species composition of the region. It was also considered as one of the most aggressive weeds of both grazing land and cereal-based agriculture and crop lands [6]. As country whole, all Wallaga Zones (H/G/Wallaga, East Wallaga, Qellam Wallaga and West Wallaga) are the major food and feed production center feeding the country. However, currently the productive and/or agricultural lands are infested by dense of *P. hysterophorus*.

Conclusion

In general, *P. hysterophorus* is an important weed in crop, grazing land and spreading vary fast at an alarming rate in the four zones of western Oromiya region of the country. Moreover, due to its allelopathic effects on soil environment this weed

may adversely affect future agriculture in western Oromiya, unless an appropriate management practices are developed and implemented in all areas where the weed was detected. Further surveys are also required to determine its full extent there. This study may provide baseline information for the development of future strategies for the eco - friendly and safe management of Parthenium weed.

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