

# Invasion and Dispersal of *Cuscuta reflexa* Weed in Kilosa District in Morogoro Region, Tanzania

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**Abstract:** A field survey was conducted at Lumuma, pwaga and Seminari villages in Kilosa district, Tanzania in 2018 to assess the invasion of *Cuscuta reflexa* weed. With the use of Quadrates number of *Cuscuta* weeds in each location was counted. Were total number of 855,640 and 340 weeds from cropping land, grazing and roadside respectively were counted in Pwaga, Lumuma and seminari village. The results show there was significantly difference in number between Crop, roadside and grazing area within surveyed villages. Irrigation water channel seem to good mode for seed weed spreading in the area, followed by Animal movement and exchange of the seeds within the area. *Cuscuta* weed was found to be spreading very rapidly along the crop areas than Natural forest and Roadsides. However high frequency number of *Cuscuta* was observed in Lumuma (94%) followed by Pwaga and Misionari (73%), (40%) respectively. The result in Crop land was similar to the weed densities were Lumuma was with highly (14 Plants/m<sup>2</sup>) weed densities compared to Pwaga (9.77 Plants/m<sup>2</sup>) and Misionari (4.35 Plants/m<sup>2</sup>). In this area irrigation canals and vehicles seems to be more active agents of *Cuscuta* spp dispersal, author wishes to recommend the integrated weed management packages for the control of the weed other precaution measure must be taken to ensure there is no further spread of the *Cuscuta* spp.

**Keywords:** *Cuscuta reflexa*, Invasive weed, integrated pest management, cropping land

## 1. Introduction

*Cuscuta* (*Cuscuta reflexa*) well known as Dodder weed or Gugu Njano in Kilosa (onion growing areas), The plant seed has hard-coated small in size and lighter in weight make seed to be easy carried away by agents of seed dispersal and remain dormant in the soil for more than 20 years [1]. The weed is also characterized by hemi-parasitic mode of nutrition at maturity stage which is achieved immediately after the young slender seedling is fully established to the host plant [2]. *Cuscuta* is an annual obligate stem parasite originating in North America. It is widely distributed to temperate and sub-tropical regions and least abundant in the tropics of Central America, Africa, South-East Asia and the Pacific Ocean. In Tanzania, dodder is distributed along the coastal areas such as Mtwara, Lindi, Kilwa, Rufiji, Mkuranga, Bagamoyo, Tanga (Pangani, Mkinga) and some parts of Morogoro [9]. *Cuscuta reflexa* has been found to parasitize a wide range of hosts such as onion, mangoes, neem tree, cashew nuts, citrus, shrubs, herbaceous succulents and a variety of grasses [10]. As it reduces their yield substantially and some parts of Morogoro farmers abandon the lands due to severe infestation of the *Cuscuta* weeds, this make shift from one place to another searching for proper cropping land [11].

Invasion of *Cuscuta reflexa* into the environments stances a major threat to native plant communities surrounds the area,

reason for health problems to humans, animals and affect agricultural production [12]. Onion farmers have been complaining on the presence and negative effect of dodder to onion crops and hence they need for immediately solutions. This was due to the fact that farmers' knowledge on spread and mode of attack of *Cuscuta reflexa* was very limited and centered to traditional values and belief, limited knowledge about its distribution, density, frequency and abundance. Hence, this study on *Cuscuta* weed which its Objective was to assess areas invaded by *Cuscuta* weed in Kilosa district and measure density, frequency and abundance of *Cuscuta* weed in invaded areas.

## 2. Materials and Methods

### 2.1 Study sites

Field survey was conducted at Lumuma, Pwaga and Seminari villages in Kilosa district located in Morogoro region. The area is found at latitude 29° 52' S and longitude 98° 66' E. The district is located in a tropical semi-arid environment with a bimodal type of rainfall and an average temperature of 25-33 °C. Short rains are received from October through to December and the long rains from mid-February through to May. The Pre-survey and field survey of the study was carried out from March to May 2018.

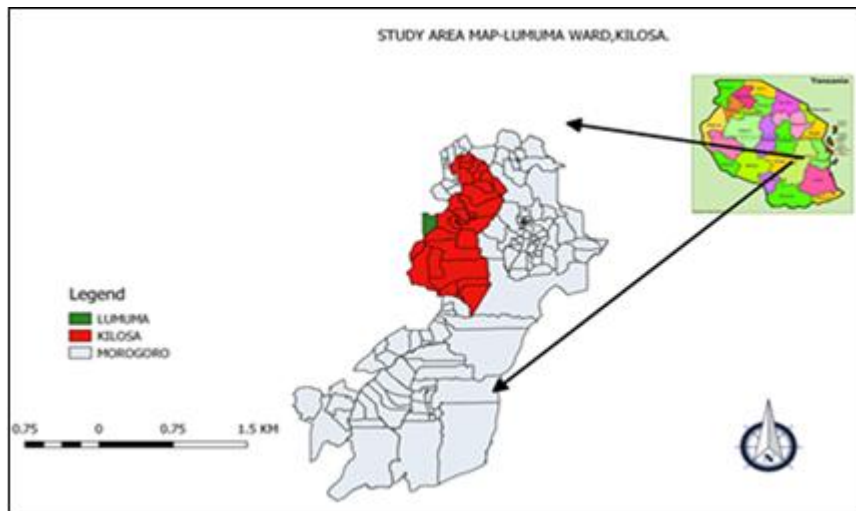


Figure 1: Map of Morogoro region showing the study ward in Kilosa District

2.2 Data collection

Quantitative survey method was carried out where on each village one field site (plot; 30m x 75m) was randomly selected for data collection. Distribution of the *Cuscuta reflexa* weed was determined as presence or absence of the weed in the crop lands, grazing lands and along roadsides. Quadrates were used to determine number of *Cuscuta* weeds in each of the selected field; and 30 quadrants (1m x 1m) were randomly located at approximately 3m intervals throughout the 75m length of the field. Number of *Cuscuta* weeds was counted within 30 randomly placed quadrants (1 m x 1 m) across the plots in the fields. Density frequency and abundance, of *Cuscuta* weeds were determined in a total of 30 (1 m x 1 m) quadrants. Density, frequency and abundance of *Cuscuta* weeds data were calculated as described by Thomas (1985) and Kamal-Uddin et al [13].

Formulas used in Computation:

$$\text{Density} = \frac{\text{Total number of Cuscuta weed in all quadrates}}{\text{Total number of quadrates use}} \dots(I)$$

$$\% \text{Frequency} = \frac{\text{Total number of quadrates in which Cuscuta weed occurred}}{\text{Total number of quadrates studied}} \dots(II)$$

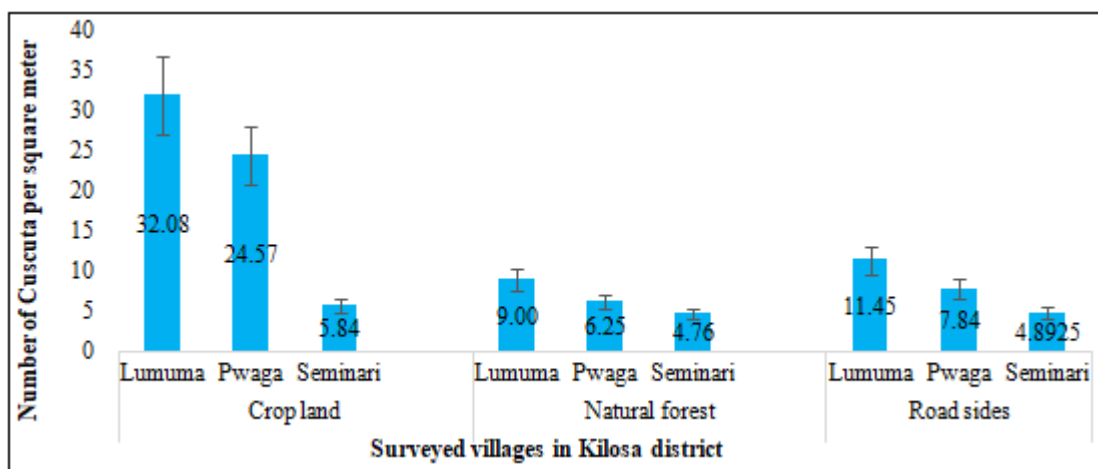
2.3 Data Analysis

Data collected were subjected to analysis of variance (ANOVA) using Genstat software V.3 statistical package (VSN International, U.K). The differences among the locations per quadrates were tested using t-test. The mean separation test was done by using Turkey at level of significance 0.05.

3. Results and Discussion

2.4 Weed occurrence and distribution

The results from surveys show that *Cuscuta reflexa* weeds can grow in the wide range cropland, Natural forest and along the roadsides were high number of *Cuscuta* weed was recorded in crop land followed by the Natural forest (Table 1) this is because farmers in Kilosa around onion growing areas they use furrow irrigation which act as good media for seed dissemination from infected field to uninfected one. From the study Lumuma shows to have high number of *Cuscuta* weeds followed by Pwaga, Cars and other vehicles act as agent of seed dispersal (Table: 1)





(a) Crop Land onion field infested by Cuscuta weed (b) Cuscuta spp in Natural forest

## 2.5 The weed indices of Cuscuta Density, frequency and Abundance

From three habitats studied highest number of weed density recorded was 14, 9.77 and 4.35 Lumuma, Pwaga and Seminari respectively. While in the frequency and abundance Lumuma and Pwaga was leading (Table: 1) The predisposing factor of this might be due to presence irrigation channel which is not clear and makes water to carry some of the seeds around different places.

**Table 1:** Density, frequency and abundance of Cuscuta weeds in three locations of the Crop land in Kilosa District

Location of the Study	Density (Plants/m <sup>2</sup> )	Frequency (%)	Abundance
Lumuma	14	94	8.33
Pwaga	9.77	73	6.96
Seminari	4.35	40	3.57

In the Natural forest Seminari shows to have high number of density of Cuscuta weeds compared to others 9.88, 8.55 and 5.97 Seminari, Lumuma and Pwaga respectively, In Seminari village the forest is undisturbed this make the weed seed bank to be very high compared to others while in Pwaga the density is low the area is full of human activities which make some seeds to be dormant and reduces the weed densities. In terms of frequency and abundance the flow was the same 98, 70 and 40 while abundance 9.4, 6.48 and 4.88 Seminari, Lumuma and Pwaga respectively (Table: 2)

**Table 2:** Density, frequency and abundance of Cuscuta weeds in three locations of the Natural Forest in Kilosa District

Location of the Study	Density (Plants/m <sup>2</sup> )	Frequency (%)	Abundance
Lumuma	8.55	70	6.48
Pwaga	5.97	40	4.88
Seminari	9.88	98	9.4

Results shows that in roadsides Pwaga have high weed density of 18.57 whilst 13.60, 8.33 Lumuma and Seminari respectively (Table: 3). High frequency of weeds observed was 97, 83 and 40 in Pwaga, Lumuma and Seminari correspondingly which was similar to weed abundance were

the highest weed abundance recorded was 10.20, 8.44 and 6.44. The peak populace and widespread of Cuscuta weed at Pwaga and Lumuma might be caused to presence of main road and regular reconstruction of road, agricultural practices and lack of natural enemies of Cuscuta weed.

**Table 3:** Density, frequency and abundance of Cuscuta weeds in three locations along the roadsides of the village in Kilosa District

Location of the Study	Density (Plants/m <sup>2</sup> )	Frequency (%)	Abundance
Lumuma	13.60	83	8.44
Pwaga	18.57	97	10.20
Seminari	8.33	40	6.44

## 4. Conclusion and Recommendations

The results obtained from this study gives clear view of the occurrences and distribution of the Cuscuta weeds in the Kilosa District and shows crop land, Natural forest and Roadsides they are all in prone for the invasion of Cuscuta, However the authors would like recommend the best study that will assess on integrated weed management practices which will help farmers around Kilosa district. Also the authority must take note on the best ways that will help to stop further spread of the weeds on other places.

## 5. Acknowledgement

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