



Intensity of *Mikania micrantha* in coffee and other plantations of Karbi Anglong district, Assam

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ABSTRACT

In Assam, the coffee plantations are confined in Chirang, Karbi Anglong and Dima Hasao districts and also has the potentiality for expansion in the foot hill regions of lower Brahmaputra Valley and Hill agro-climatic zones of the state. Weed management is the biggest problem for coffee cultivation in the state and *Mikania micrantha* is one of the most problematic weeds in most of the coffee plantations. To quantify the infestation of the weed in and around coffee growing areas, a survey was conducted in five coffee plantations and 19 locations of other plantation crops as well as open forests covering an area of 355 km² in Karbi Anglong district of Assam. *M. micrantha* infestation was negligible to low in coffee plantations, which received two rounds of manual weeding whereas, the infestation was moderate to high where only one manual weeding or no weeding was done. In open forest, the density of the weed was quite high. Among the coffee estates surveyed, the highest infestation of *M. micrantha* was observed in the estates surrounded by open forests and neglected other plantation crops which served as a good seed source for this weed.

India is the seventh largest producer of coffee in the globe and contributes 3.30 and 4.85% of world coffee production and export, respectively (Anonymous 2018a). In Assam, coffee cultivation covers an area of 1249 ha (Anonymous 2018b) and is confined in Chirang, Karbi Anglong and Dima Hasao districts and bears potentiality for expansion to a great extent at least in the foot hill regions of Lower Brahmaputra Valley and Hill agro-climatic zones of the state. Among the hurdles of coffee cultivation in northeast India, weed management is one of the most critical ones. Of the most common weeds, *Mikania micrantha* H.B.K. is the highest troublesome species. And hence, a survey was undertaken with an aim to quantify the *Mikania micrantha* infestation in and around coffee growing areas of Karbi Anglong district of Assam covering an area of 355 km².

The survey of the distribution *M. micrantha* was carried out in five coffee plantations and their adjoining other plantations in Karbi Anglong district of Assam during 2016 and 2017 as shown below:

At each plantation area, a 1.0 ha plot was selected and abundance of *M. micrantha* was assessed from altogether 50 spots placing 1m x 1m quadrates randomly. The number of stalks of *M. micrantha* counted in each quadrate was considered as individual plants by following Puzari *et al.* (2010). These numbers were assigned grades (**Table 1**) to indicate a ranking on the basis of abundance of *M. micrantha*. This grading was based on Puzari *et al.* (2010) which in turn is a modified version of Shankaran and Pandalai (1999) as shown in (**Table 1**).

Name of coffee estates surveyed	Geographical location		Elevation (m MSL)
	Latitude (DD)	Longitude (DD)	
Suraj Timung estate, Chandmari, Diphu	25.8275182100	93.4163681600	197
Babu Tisso estate, Harichand Tisso	25.9065526987	93.5090036318	189
Dillai Coffee estate, Diliai	25.9496371858	93.5898420587	183
Sanjay Tisso estate, Sarihajan	26.0639234794	93.7624988705	116
Regional Coffee Research Station (RCRS), Chutianala, Diphu	25.9249811600	93.4393791100	165

Table 1. Grading of *M. micrantha* intensity based on population

No. of individual plants of <i>M. micrantha</i> per ha	Grade
0	Absent
1-200	Negligible
201-400	Scattered
401-600	Low
601-800	Moderate
801-1000	Medium
Above 1000	High

The data on severity of *M. micrantha* in coffee and other plantations of Karbi Anglong district of Assam (**Table 2**) showed that *M. micrantha* infestation was negligible to low in 60% coffee plantations, which experienced at least two rounds of manual weeding. In the remaining 40% plantations where only one manual weeding or no weeding was done *M. micrantha* infestation was moderate to high.

Table 2. Severity of *M. micrantha* infestation in different plantations

Type of plantations surveyed	Grade of infestation [Shankaran and Pandalai (1999) and Puzari <i>et al.</i> (2010)]							Total Nos. of plantations surveyed
	Absent	Negligible	Scattered	Low	Moderate	Medium	High	
Coffee	0	1	1	1	1	0	1	5
Teak (young)	0	0	0	0	0	0	2	2
Rubber (young)	0	0	0	0	0	0	2	2
Banana	0	0	0	0	0	0	1	1
Open forest	0	0	0	0	0	0	14	14
Total	0	1	1	1	1	0	20	24

[Tree canopy coverage 0-40% in Open forest]

Table 3. Status of *M. micrantha* in coffee estates of Karbi Anglong district and their adjacent plantation crops during 2016 and 2017

Plantation area	Elevation (m MSL)	Tree and shrub stands supporting <i>M. micrantha</i>	Light intensity below plant canopy (summer)	<i>Mikania</i> control practice adopted	<i>Mikania</i> population* (no./ha)	<i>Mikania</i> dry wt.* (g/m ²)	<i>Mikania</i> intensity grade
Suraj Timung estate	197	Coffee, arecanut, banana, jack fruit	20-40%	MW 2 times	600	1.91	Low
Banana	211	Banana, <i>Chromolaena odorata</i> , <i>Lantana camara</i>	100%	nil	3600	12.79	High
Rubber (young)	215	Young rubber, <i>Chromolaena odorata</i> , <i>Lantana camara</i>	100%	nil	3400	11.92	High
Babu Tisso estate	189	Coffee, Sirish, Neem, Kanchan	40-70%	MW once	800	3.37	Moderate
Open forest	188	<i>Clerodendrum viscosum</i> , <i>Mallotus philippinensis</i> , <i>Stachyterpheta jamaicensis</i>	80-100%	nil	3000	8.86	High
Open forest	182	<i>Chlerodendrum viscosum</i> , <i>Mallotus philippinensis</i> , <i>Stachyterpheta jamaicensis</i>	100%	nil	3400	9.64	High
Open forest	181	<i>Clerodendrum viscosum</i> , <i>Lantana camara</i> , <i>Stachyterpheta jamaicensis</i>	100%	nil	3200	9.40	High
Open forest	186	<i>Chromolaena odorata</i> , <i>Lantana camara</i> , <i>Stachyterpheta jamaicensis</i>	100%	nil	3000	8.98	High
RCRS estate	165	<i>Acacia lenticularis</i> , <i>Casia sp.</i> , <i>Albizia odoratissima</i> , <i>Albizia lebbek</i>	30-50%	MW 2 times	400	0.98	Scattered
Open forest	170	<i>Chromolaena odorata</i> , <i>Lantana camara</i> , <i>Clerodendrum viscosum</i> , <i>Morus alba</i>	100%	nil	2000	6.24	High
Open forest	174	Small forest tree	80-100%	nil	2000	6.96	High
Open forest	167	<i>Chromolaena odorata</i> , <i>Lantana camara</i> , <i>Chlerodendrum viscosum</i>	100%	nil	2200	6.98	high
Open forest	160	<i>Chromolaena odorata</i> , <i>Lantana camara</i> , <i>Morus alba</i> , <i>Chlerodendrum viscosum</i>	100%	nil	2200	7.09	high
Rubber (young)	164	Young rubber, <i>Chromolaena odorata</i> , <i>Lantana camara</i>	100%	nil	3000	11.60	high
Sanjay Tisso estate	116	Arecanut, jack fruit, teak, jamun	20-40%	MW2 times	200	0.28	negligible
Open forest	118	<i>Chromolaena odorata</i> , <i>Mallotus philippinensis</i> , <i>Stachyterpheta jamaicensis</i>	100%	nil	3800	10.12	high
Teak (young)	118	Young teak	100%	nil	2800	8.92	high
Teak (young)	116	Young teak	100%	MW once	2800	9.13	high
Open forest	119	Small forest tree	100%	nil	2600	7.95	high
Dilai coffee estate	183	<i>Albizia lebbek</i> , <i>Acacia lenticularis</i> , <i>Artocarpus heterophyllus</i> , <i>Morus alba</i> , <i>Clerodendrum viscosum</i> , <i>Stachyterpheta jamaicensis</i>	50-70%	nil	4000	10.88	high
Open forest	193	Small forest tree	100%	nil	2800	9.00	high
Open forest	196	Small forest tree	80-100%	Nil	3600	9.80	high
Open forest	184	Small forest tree, <i>Chromolaena odorata</i> , <i>Lantana camara</i>	100%	nil	3200	9.14	high
Open forest	190	Small forest tree, <i>Chromolaena odorata</i> , <i>Lantana camara</i>	100%	nil	3800	9.40	high

*(Rounded up average value of 50 quadrates); MW = Manual weeding

As many as 19 different crops in and around coffee estates in the Karbi Anglong district of Assam have been surveyed to know the status of *M. micrantha* as the *Mikania*-stands of neighbouring areas are the sources of seeds for infestation in coffee plantations. It is seen that, in open forest (tree canopy density less than 40%), the degree of infestation of the weed was quite high. *M. micrantha* grows best in habitats having good light conditions combined with vertical supporting structures, such as trees and shrubs. High infestation of the weed was also noticed in young rubber and teak plantations. The plantations with high magnitude of infestation of *M. micrantha* adjacent to the coffee plantations (**Table 3**) were because of ill management practices and were the major sources of seeds for repeated migration of the weed in coffee plantations. The average dry weight of *M. micrantha* in high graded plantation crops varied from 6.24 g/m² to the extent of 12.79 g/m² in the low elevation hilly tracts of Assam. Among the five coffee estates of the district, the highest infestation of *M. micrantha* was observed in Dilai coffee estate followed by Babu-Tisso estate and both the estates were surrounded by open forests as a good seed source of the weed.

From the study conducted in coffee estates and their neighbouring other plantations in Karbi Anglong district, it was concluded that (i) unless adoption of management practices, *Mikania* infestation might become severe in plantation crops, (ii) the crop designing to maintain closer canopy coverage is one of the good practices to get rid of this notorious invasive weed and (iii) the ill managed plantation crops, which were quite high in number, were the major sources of *M. micrantha* seeds for repeated migration of the weed to the coffee estates of Karbi Anglong.

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