

Biology and infestation of *Parthenium hysterophorus* L. in new alluvial zone of West Bengal – a survey

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Congress grass or carrot weed (*Parthenium hysterophorus* L.) is a native of tropical North and South America (Mexico, USA) and West Indies. It is a herbaceous, erect and annual plant belonging to the family *Asteraceae* (*Compositae*) and has now become a major weed of regional, national or international importance within a short period of time because of its huge seed production ability with small and lighter seeds that can travel a long distance through wind, water, birds, other animals, traffic and transported goods (Das, 2008). The weed was introduced first with milo grain (*Sorghum Bicolor*) seed in India and was first noticed in Pune in 1955. Now, it has been spreading over most of the cropped as well as non-cropped areas of the country, thereby posing a serious concern owing to its hazards. Hence, understanding weed biology and ecology is of prime importance towards its successful management.

A two years survey work was undertaken during September-December, 2007 and 2008 to determine the *Parthenium* density (plants m²) at six different spots viz., Viswavidyalaya Farm (Kalyani), Saguna, Ghoragacha, Chandamari, Kanpa and Bijpur in the district of Nadia, located in new alluvial zone of West Bengal, India. Survey spots were selected at 5 km apart from one another. Weed biology was studied and data were recorded by taking average of twelve plants. Growth parameters including plant height, formation of branches and leaves, and dry matter accumulation and plant biology such as seedling, branching, flowering, fruiting and maturity stages of weed growth were recorded. An area of 6 × 5 m² in the Farm road side at 'C' Block farm, Kalyani was cleared by spading. 10 kg weed seed free soil and sand mixture (1 : 1 ratio) was placed in the surface of each 5 blocks of 1m x 5m area demarcated for observation recording. 100 dried matured *Parthenium* seeds were sown on 6th September 2007 in each experimental block. 5 plants block⁻¹ (total 25 plants) were labeled for taking observations.

The data as presented in (Table 1), showed that *Parthenium* had the potentiality to invade both the cropped as well as non-cropped areas including

From the present study, it may be concluded that *Parthenium* should be controlled before flowering stage, besides taking immediate attempt to manage it

road sides, fallow lands, waste lands, bunds and field channels of which maximum density (39.2 m⁻²) was noted in road side areas followed by the bunds areas (10.9 m⁻²) and field channel (7.8 m⁻²) places where as in cropped area the *Parthenium* density was only (4.4 m⁻²). Survey also revealed that the non-cropped areas were more heavily infested than the cropped one, thereby suggesting that spread of *Parthenium* in crop field can be checked to a great extent by controlling it first in non-cropped areas. Das (2008) also opined that *Parthenium* invasion in crop fields can be checked by controlling them in non-cropped areas. The growth stages of *Parthenium* as observed from the twelve plants could be divided into five stages viz., seedling, branching, flowering, fruiting and maturity. Average plant height at maturity was observed to be 92 cm with 5 primary and 10 secondary branches having 91 leaves and dry weight of 23.90 g plant⁻¹ (Table 2).

Studies on weed biology showed that *Parthenium* had higher seed producing ability (about 2,422 seeds plant⁻¹) with very light seeds (test weight 0.46 g) having high germinability (78.5 %) and it came to maturity at 121 days when it recorded dry weight of (2.39 or 23.90) g plant⁻¹, stem diameter of 1.6 cm, root length of 20.5 cm and 183.50 heads plant⁻¹ having 13.20 seeds head⁻¹ (Table 2). Similar findings were recorded by DWSR (2010) and Ghosh *et al.* (2010).

Parthenium had higher seed producing ability with very light seeds having tremendous germinability. The collection of seed is rather difficult because of their small size and shedding during ripening. Initiation of inflorescence (head or capitulum) is terminal, scorpioid and seems to terminate the vegetative growth of the plant. Inflorescences borne on branched peduncles held at the top of the plant are hairy and give a whitish appearance. Flowering and fruiting continue profusely throughout the year. Bhowmick (1999) also noted it as a prolific weed of West Bengal. *Parthenium* colonies could be seen in all stages of its growth throughout the year (Sukhada, 1975; Mahadevappa, 2009). In non-cropped areas and subsequently in cropped areas of the state.

Table 1: Mean plant density (No. m⁻²) in various spots over two years

Sample	Cropped area	Non-cropped area		
		Road side area	Bunds	Field channel
1	06	35	11	07
2	04	42	14	10
3	07	55	10	08
4	05	24	09	06
5	03	53	12	10
6	08	39	09	08
7	02	41	13	05
8	01	30	10	12
9	03	48	14	09
10	05	25	07	03
Mean	4.4	39.2	10.9	7.8

Table 2: Different growth stages of *Parthenium* (mean of two years)

Stage	Age (days)	Plant height (cm)	Leaf number	Branches		Dry weight (g plant ⁻¹)
				Primary	Secondary	
Seedling	10	19	05	-	-	0.15
Branching	20	31	08	-	-	0.52
Flowering	35	55	12	-	-	3.26
Fruiting	60	65	27	3	-	11.38
Maturity	121	92	91	5	10	23.90

Table 3: Biology of *Parthenium hysterophorus* L. (Average of twelve plants over two years)

Sl. No.	Character	Description	Sl. No.	Character	Days
1	Habitat or affinity to vegetation formation	Roadside / fallow land / waste land / crop field / irrigated upland	13	Seedling emergence	7
2	Summer shedding	Ephemeral	14	Cessation of shoot elongation	75
3	Succulence	Non-succulent	15	Floral bud initiation	27
4	Stem diameter at maturity (cm)	1.60	16	Onset of flowering	32
5	Root length at maturity (cm)	20.50	17	Formation of four primary branches	42
6	Number of heads plant ⁻¹	183.50	18	Formation of ten secondary branches	75
7	Number of seeds head ⁻¹	13.20	19	Fruiting	37
8	Number of seeds plant ⁻¹	2422.20	20	Fruit maturity	59
9	1000-seed weight (g)	0.46	21	End of flowering	80
10	Seed germination (%)	78.50	22	Onset of leaf shedding	41
11	Dry weight (g)	23.90	23	80% leaf shedding	105
12	Plant height (cm)	92.00	24	Complete plant maturity	121

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