SPREAD OF *Mimosa invisa* : PROGRESSION THROUGH THEIR SEEDINESS INTO KAZIRANGA TIGER RESERVE, ASSAM

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INTRODUCTION

o As invasive species produce more seeds annually than the native species, it makes them easier to spread enormously.

o *Mimosa* is an invasive in India, native of Brazil, in tropical South America and as it acts as a nitrogen fixer. It was imported into India by tea gardeners for soil fertility improvement in tea garden in the 1960s (Debnath., 2017).

o *M. invisa* is a spiny weed that has severely infested the Kaziranga Tiger Reserve in Assam, by reducing the food resources of herbivores including the one horned rhinoceros (Vattakavan et al., 2003).

o Very few studies are observed in India over the invasion of *Mimosa*. Debnath 2017, on two invasive alien giant sensitive weeds - new additions to the flora of Tripura, India, has reported presence of *M. invisa* over there. Jayasree et. al, (2006), studied adverse effects of mimosa invisa mart. Infestation on the floral biodiversity in Kerala. A single study on the seediness of *M. invisa* has been reported by Choudhury et al., (2019) in Rajiv Gandhi Orang National Park (here after RGONP).

o Keeping in mind the knowledge gaps on the invasiveness of plants in India, the present study is focused to analyze the relation between the seed numbers, pod length and cluster sizes of *M. invisa* to provide an insight of its germination.

o We have assessed how cluster sizes and pod lengths plays a role in producing more number of viable seeds to help in dispersion of this invasive plant throughout KTR.

METHODOLOGY

To estimate the average number of pod-clusters and seed produced by each plant in a season, the pods of 20 adult *M invisa* plant were counted from the different range of KTR during January to February 2021.

Ten pod-clusters were plucked from each plant, pod-cluster size and number of seeds inside each pod was recorded along with the length of the pod.

The length of pods was measured by using digital Vernier calliper.

The total number of seeds produced by *M invisa* plant was calculated following formula

Number of seeds per plant = (number of pod-clusters of that plant) x (number of pods per pod-cluster of that plant) x (number of seeds per pod) (Chaudhary et al., 2019).
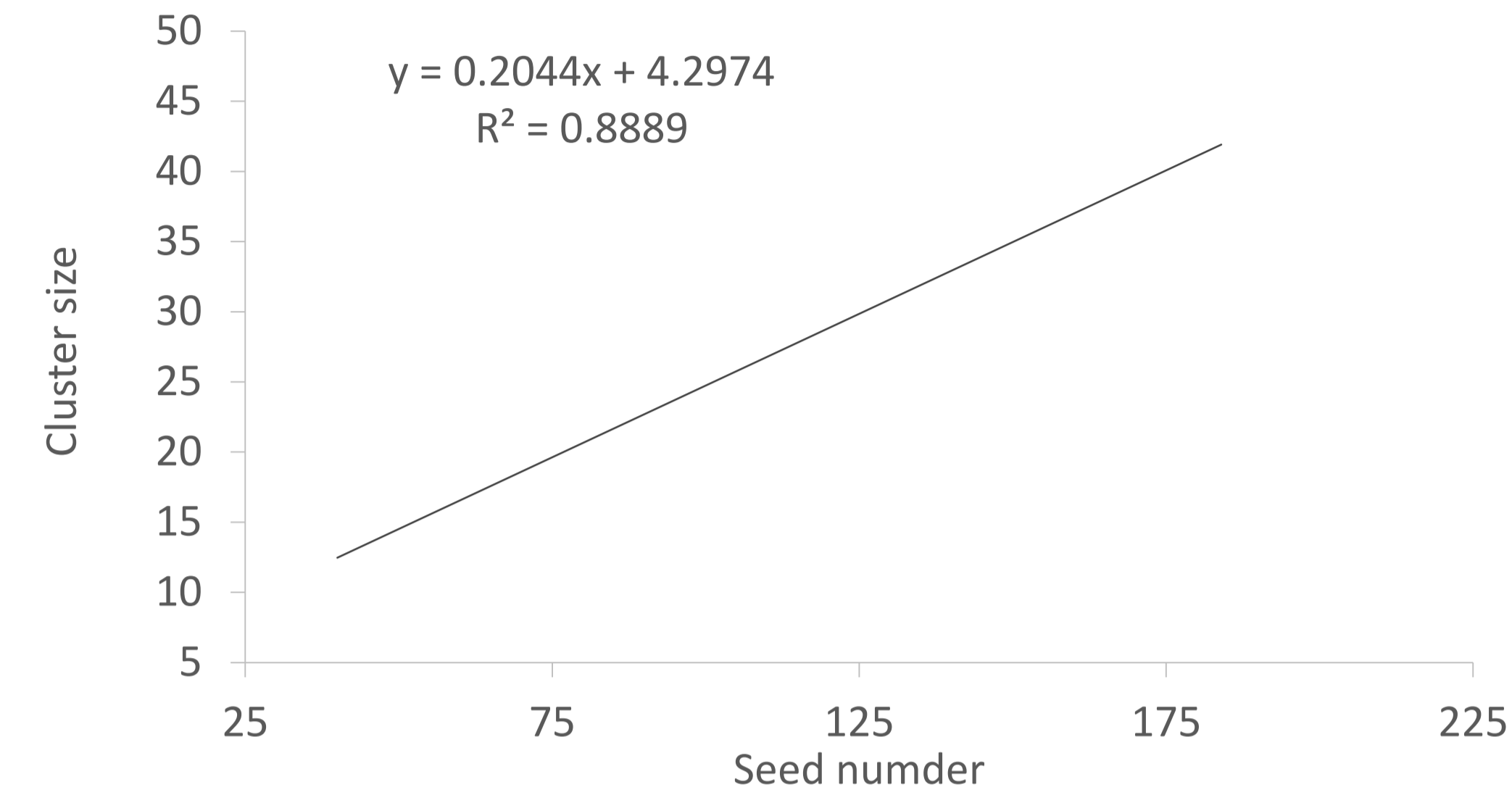
RESULTS

$y = 0.2044x + 4.2974$
$R^2 = 0.8889$

Figure:1- *Mimosa invisa* seed production versus cluster size

$y = 0.0074x + 19.077$
$R^2 = 0.9565, P<0.01$
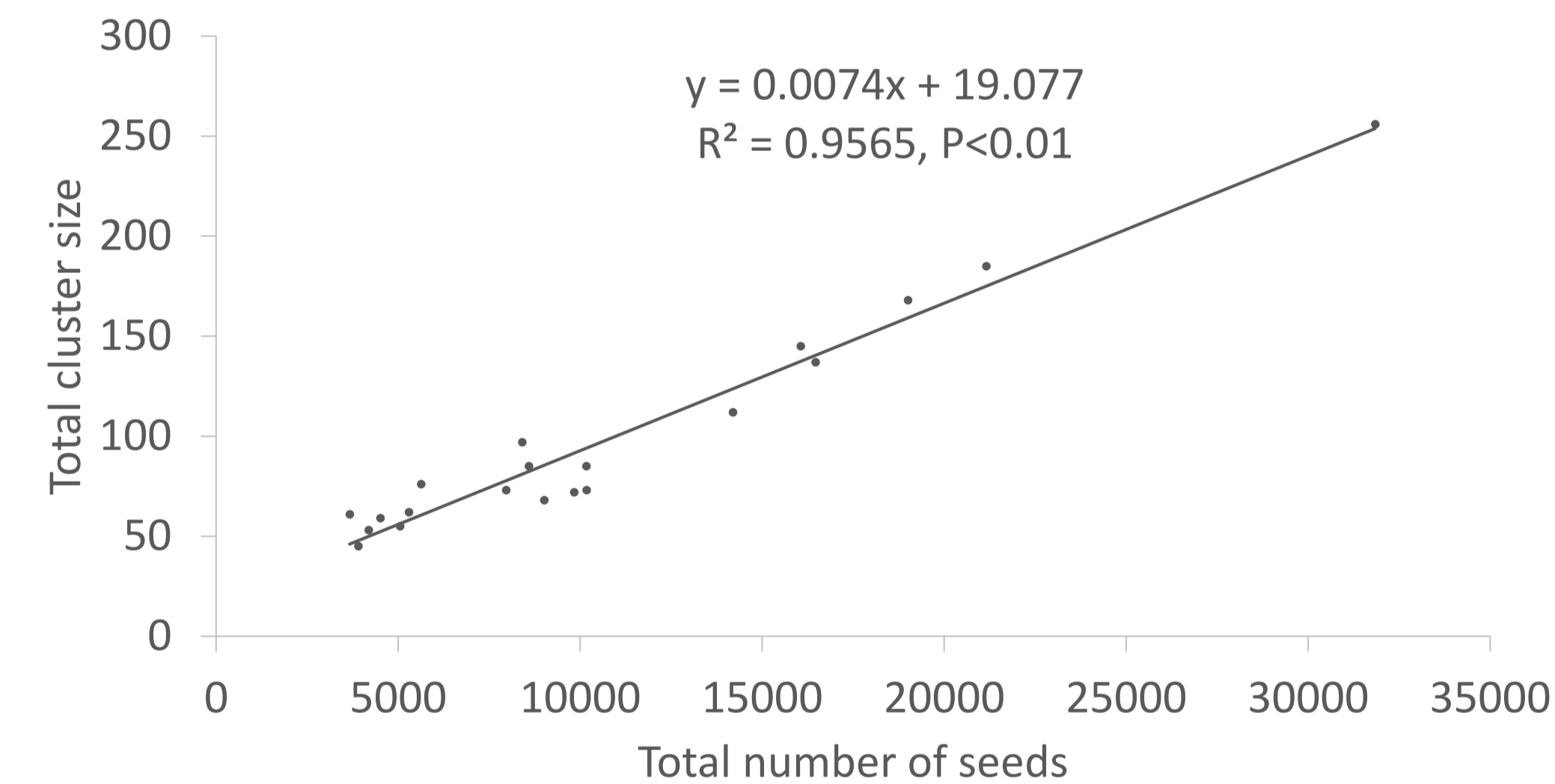
Figure:2- Relationship between number of seeds produced by *Mimosa invisa* plant and cluster size

$y = 3.4575x + 7.1268$
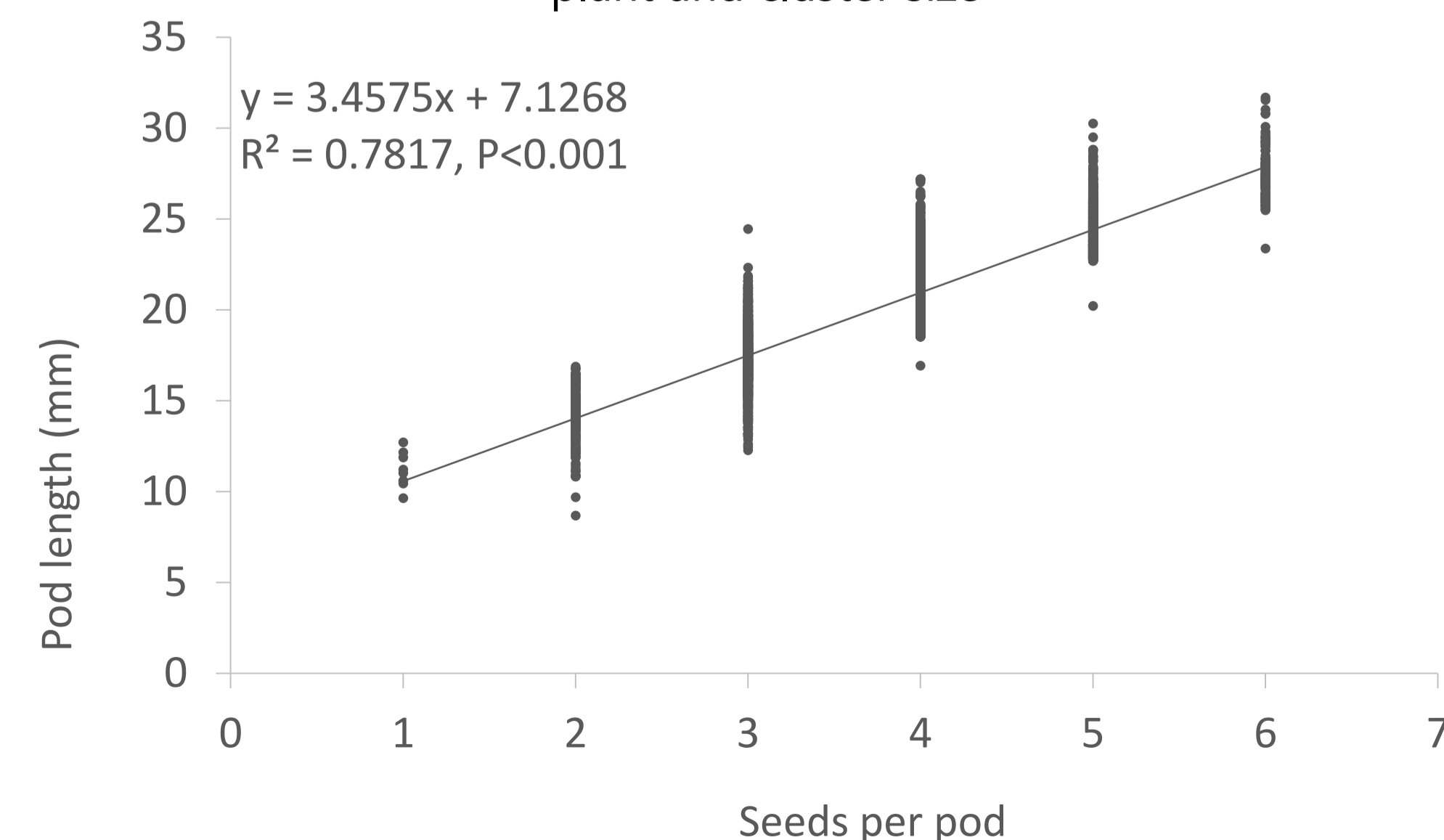$R^2 = 0.7817, P<0.001$

Figure:4- Relationship between seeds per pods and pod length (mm) in *Mimosa invisa* plant

DISCUSSION

➢ In this study, we have shown the correlation between the cluster sizes versus the seed number, total number of seed versus total number of cluster, and between seed per pod versus their pod lengths. For every cases that we observed, found a positive correlation among them.

➢ Seed production of *M invisa* ranged from 3908-31841 seeds per plant with a mean of 10756.47±1568.44. Mean pod cluster production range of *Mimosa invisa* plant in between 45-256 pod cluster per tree came out as 98.35±11.81 pod cluster per tree. Mean production of seeds by a pod ranging from 1-6 seeds per pod with a mean of 4.31±0.04 seeds per pod (n=400). Out of 4.31±0.04 seeds, 3.76±0.05 seeds (n=400) with a range of 1-6 seeds were firm and healthy, while 0.54±0.04 seeds (n=400) with a range of 1-4 seeds were damaged and unhealthy.

➢ Mean cluster production of *M invisa* plant ranged from 10-44 pod cluster per plant (n=200) with a mean of 24.79±0.48 pod cluster per plant. Mean seed production per seed cluster for *M invisa* ranged from 40- 184 seeds with a mean of 100.26±2.21 seeds per cluster (n=20) plants.

➢ Regression analysis revealed a significant positive relationship ($R^2 = 0.95$) between number of seeds and cluster size of *M invisa*. Further regression analysis indicates a significant positive relationship ($R^2 = 0.63$) between seeds produced by a pod and their respective pod lengths (mm). With the increasing number of seeds present in per pod, the pod length increases.

➢ *M. invisa* is an archetypal r-selected species that emphasize high growth rates and exploit less-crowded ecological niches. Being a r- selected species, *M invisa* are highly mobile, long lived, and have high reproductive potential. It can remain dormant up to 50 years if undisturbed. Considering the total number of seeds produced by *Mimosa invisa* in our study, for one season which comes up to approximately 10756.47±1568.44 SE seeds per plant, in moist condition if 90% of the total seeds (9680) germinate (Choudhury et al., 2019) to grow into adult plant, it is a threat to the landscape and for native biota. Therefore, it could be devastating for the ecosystem if the growth rate will not be obstructed.

➢ The present study determines that cluster size is a strong predictor of seed production ($R^2 = 0.95$) from *M invisa* plants sampled from KTR. Our result also shows significant effect of pod lengths over the seed production (R2 = 0.63).

CONCLUSION

▪ The success event of invasion of *M. invisa* came forward in the KTR due to its prolific seed production and prolonged fecundity. *M invisa* is an annual plant, for which flowering occurs in the first year of its development.

▪ Seed production appears after a year and their viability is >50 years having almost 90% germination probability. Thus, *M invisa* is not only advantageous over the other species having a reproductive start of one year, the prolific seed production warrants its readily colonized manifestation.

▪ For management purposes, the plant could be completely uprooted followed by burning to achieve the best results. Eradication should be done twice a year: once in October – November before flowering and January and early February before the seeds are mature and once in May - June when young regenerated plants carpet the ground.

▪ A targeted awareness campaign be conducted among the forest guards to educate them about the menace of mimosa.

▪ For further management purpose in Kaziranga, it is needed to design experiments to ensure the germination rate and seed viability of *M invisa*. Additional studies could be emphasized to understand and reduce the mode of dispersion of the plant.