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Endozoochorous seed dispersal by Jalauni sheep in tropical climate: recovery and germinability under natural pasture grazing

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Introduction

Herbivores can play an important role in seed dispersal. Climate, available vegetation for grazing, pasture situation can determine the seed dispersal trends by the grazing animals. Tropical climate of India with wide climatic variation leads to fluctuating herbage quality and available biomass. Ruminants spread plants through fecal pellets after grazing at one place and fecal voiding at another. Herbivores can play an important role in seed dispersal. Climate, available vegetation for grazing, pasture situation can determine the seed dispersal trends by the grazing animals. Tropical climate of India with wide climatic variation leads to fluctuating herbage quality and available biomass. Ruminants spread plants through fecal pellets after grazing at one place and fecal voiding at another. Sheep have narrow mouths and flexible lips than other ruminants that lead them selective grazing on palatable forage (Grande *et al.*, 2013). During dry season and harsh climate they are forced to graze on dried up grasses and twigs and thereby consume mature seed and seed those not digested passes through fecal pellets that has endozoochorous characteristics. Herbivores can affect vegetation by driving dispersal patterns of plants or zoochory (Fenner and Thompson, 2005). For grazing animal, germination success of seed from fecal pellets determined by the eating rate of animal under grazing along with palatable plants (Pakeman *et al.*, 2002) and the solvability of seed in the digestive system.

Tropical climate pasture dominated by different grass species along with weeds has bushes too for browsing. During late winter to dry season between January to May, animal compelled to graze on available dry grasses and weeds and those seed disperse through pelleting in other areas. Information on this regard is very rare to compare and present studies conducted at tropical climate of India during January to May.

Materials and Methods

This study was conducted through screening of fecal pellets of Jalauni sheep those were under grazing on natural pasture at central research farm of IGFRI, Jhansi situated at 25.43N 78.58E with average elevation of 284 meters. Jhansi experiences extreme climate and mercury goes at 4 degree minimum in winter and summer temperature can peak at 47 degree in May. Natural pasture is dominated by grasses and bushes with weeds. Jalauni sheep are the recognized draught sheep breed in the area and well adapted with the situation. Study carried out during January to May allowing a flock of 40 adult sheep to graze on natural pasture. Representative fecal samples were collected using collection bags and metabolic cages. Pellets were dissolved to strain in and collected samples tested for germination in laboratory. Seed retrieved were divided mainly in to three groups as Grass seed, seed of weeds and legumes and herbaceous bushes.

Results and Discussion

Total seeds retrieved were classified into three categories considering their dominancy in fecal pellets. Among those three categories maximum 73.71% seed retrieve were wild leguminous plants and weeds, followed by mixed grasses about 25.77%. Daily seed pass out was also dominated by seeds of weeds which were about 1965.97 in numbers. However, seeds of woody plants like *Z. nummularia*, *L. leucocephala* etc. were very rare might be due to specific grazing behavior of sheep that avoid browsing on bushes and concentrate on grazing (Harold, 1954). Germinability of grass seed was 31.13% of retrieved seed and it was comparable with seed of weeds and legumes like *Trifolium repens*, *Trifolium dobium* and *Stelaria medica*, which had 30.48% viable seed after rumen pass of seed. The same was the trend of endozoochory of seed dispersal after rumen pass out of about 27% reported earlier also. (Eric *et al.*, 2005).

Among the total seed retrieved only 30.45% found viable for further propagations. However, among the total retrieved seed 73.71% found weed or wild legumes due to which common pasture might be dominated by weeds. But dispersal of woody plant was very less by sheep as only 13.64 or 0.51% seeds were woody bushes. Animal undoubtedly aided in the spread of desirable legumes in pasture. Germination condition can differ between plant species as reported earlier.

Potentiality of sheep in endozoochory becomes obvious considering viable seed percent of both grasses and weeds seed which was around 30%. Previously a still larger fraction (41%) of plant species was reported in large herbivores (Pakeman *et al.*, 2002.).

Table1: Seed retrieved and their germinations

Type of seed	Seed retrieval per 20 pellets	Per cent among the total	Total number of seed voided daily	Average number of seed germinated per 20 pellets	Germination per cent
Mix Grass seed	15.61± 1.36	25.77	687.32±0.31	4.86±0.51	31.13%
Herbaceous plant/ bushes	0.31±0.11	0.51	13.64±0.09	0	0
Seed of wild weeds and legumes	44.65±3.96	73.71	1965.97±0.97	13.61±1.33	30.48%

Conclusion

Jalauni sheep have their home tract in semi arid tropics of India and mainly thrives on grazing on natural pasture dominated by grasses and weeds with scanty bushes. During their nomadic grazing they can carry different seeds or seedling spreading their pellets unevenly. Sheep fecal pellets contained 25.77% seed of grasses and 73.71% weeds and wild legumes. Due to their typical grazing habits, role of sheep in endozoochory found nearly limited in dispersal of grasses and wild seedling of legumes. They carry 31.135 viable seedlings of grasses and 30.48% viable seedling of weeds. Thus, the pasture grazed by sheep enriched with grasses and weeds.

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