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Short Communication

Status of grasses and sedges used as main natural food plants by Indian wild ass in the fringe areas of little Rann of Kachchh (LRK), Gujarat, India

Ashok M. Suthar*, Ketan S. Tatu and R.D. Kamboj
Gujarat Ecological Education and Research (GEER) Foundation, Indroda Nature Park, P. O. Sector-7, Gandhinagar, Gujarat-382 007, India
Sutharashok98@gmail.com

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Abstract

The Little Rann of Kachchh (LRK) is a well-known stronghold of Indian Wild Ass (Equus hemionus khur). Fringes of the LRK, especially the southern fringe, represent the areas of the LRK where maximum population of Wild Ass occurs due to relatively perpetual availability of water and food in the form of agricultural crops due to existence and expansion of a major irrigation canal system of the state. However, these fringe areas not only raise agriculture crops that constitute food for Wild Ass, but are also endowed with certain grasses and sedges that constitute the main natural food of the Wild Ass. A comprehensive ecological field-study was carried out from October 2015 to March 2017 in the LRK and as a part of it, status (i.e. per cent cover and frequency of occurrence) of natural food-plants (i.e. grasses and sedges) of the Wild Ass was also assessed in the southern, eastern and western fringe (along with small northern fringe) areas. The study revealed that though the southern fringe was inhabited by the highest population of Wild Ass (n=1,268 as per the Wild Ass Population Census-2014 by Gujarat Forest Department), the per cent cover and frequency of occurrence of their main natural food - grasses and sedges were very low/lowest among all the fringes. Such a scenario reflects the likely depletion of the grasses and sedges that are used by Wild Ass as the main natural food plants. Such a situation may further lead to over-dependence of Wild Ass on its man-induced food, i.e. agricultural crops and it can further lead to the increased man-animal conflict. As Wild Ass is a Schedule-1 species as per the Wildlife (Protection), Act, 1972, for its effective conservation, restoration of grass cover and that of sedges on the southern fringe is recommended.

Keywords: Food, frequency, fringe, grasses, little Rann of Kachchh, LRK, per cent cover, sedges, wild Ass.

Introduction

Little Rann of Kachchh (LRK), distributed over Kachchh, Banaskantha, Patan, Morbi and Surendranagar districts of Gujarat State represents a unique combination of a saline desert and a vast seasonal wetland[1-4]. From mid-monsoon to early winter each year, large portion of it functions mainly as a wetland, but with the onset of summer and evaporation of inundated waters, it gets transformed into a saline desert-the *Rann*. Large portion of LRK and its adjoining areas are under the legal protection as the Wild Ass Sanctuary (WAS) having an area of 4,954 km^2. As per Lieut. Burns in his Memoires (1828-1829), the Rann is 'a space without counterpart in the globe'[5].

The LRK is globally famous as a stronghold area of the Indian Wild Ass (*Equus hemionus khur*) - an endemic species to India[2]. As per the IUCN's Red List of Threatened Speceis-2017, the Indian Wild Ass is a globally Near Threatened (NT) species. A total of 4,451 individuals of Wild Ass were estimated during the latest Wild Ass Population Census conducted by Gujarat Forest Department in 2014[6]. As it is a Schedule-1 species as per the Wildlife (Protection) Act,1972 and also a flagship species of the LRK, it is important to make various efforts for its *in situ* conservation. Understanding the status of food/diet of the Wild Ass through research and managing it based on research finding is one such effort.

As a part of a comprehensive ecological field-study of the LRK from October 2015 to March 2017, researchers from Gujarat Ecological Education & Research (GEER) Foundation determined main natural food plants (i.e., food plants other than agricultural crops) of the Wild Ass through literature survey, personal *in situ* observations and conversation with local village-based naturalists having good knowledge and understanding of local natural history of the LRK. It was found that certain grasses (i.e., species belonging to Poaceae family) and sedges (i.e., belonging to Cyperaceae family) constituted the main natural food of the Wild Ass. As the southern fringe is known to support maximum number of Wild Ass (n = 1,268) as per the Wild Ass Population Census-2014 by Gujarat Forest Department (GFD), it was considered worthwhile to determine the status (i.e., per cent cover and frequency of occurrence) of their main natural food i.e. grasses and sedges on the southern fringe in comparison with their status on western fringe (along with the small northern) and the eastern fringe. It was premised that if the per cent cover and frequency of grasses and sedges on the southern fringe was high enough to be more than that on

the western fringe and eastern fringe having relatively low population of Wild Ass (i.e., 846 individuals on western fringe and 710 individuals on the eastern fringe)[6], then the status of Wild Ass's natural food on the southern fringe can be considered to be good enough to support high Wild Ass population.

Study area: Fringes of the Little Rann of Kachchh constituted the main study area for this study on assessment of grasses and sedges constituting the main natural food/diet of the Wild Ass in LRK. The southern, eastern and western fringes (along with small northern fringe) were the ecotonal boundaries of the Little Rann of Kachchh that is located between latitudes 22°55'N and 24°35'N and longitudes 70°30'E and 71°45'E[6]. The fringes were the transitional zones between the vast saline mudflat area of the actual "Rann" [which is just above the sea level and adjoining Gulf of Kachchh][7] and the upland/mainland adjoing the Rann. They were typically characterized by the presence of natural (wild) herbaceous cover towards the Rann's saline mudflat and croplands towards the mainland/upland.

Methodology

Species of grasses and sedges constituting the main natural food of Wild Ass were determined from authentic literature, especially the Management Plan of Wild Ass Sanctuary[2] and research literature especially that of[7,1]. Moreover, to understand natural food-plants of Wild Ass, *in situ* observations were also made wherever Wild Ass were found grazing. Local persons having in-depth knowledge about natural history of Little Rann of Kachchh were also interviewed to understand main natural food plants of the Wild Ass. Inventorying of grasses and sedges used as food by Wild Ass was largely carried out by conducting 23 fringe transects having average length of 3 km. As a part of systematic sampling design, these transects were laid at regular spatial interval of about 15 km from each other and with uniform orientation. Further, on each transect, Daubenmire quadrats (50cm x 20cm) were laid at regular interval of 500 m to determine percent cover and frequency of grasses and sedges having potential to constitute food of Wild Ass. A total 156 Daubenmire quadrats were laid in fringes of LRK. As per the standard practice, the observed values of per cent cover were converted into the mid-point per cent cover value on Daubenmire scale (Table 1) to determine per cent cover of each grasses and sedges species[8].

Frequency: Frequency refers to the degree of dispersion of an individual species in an area and usually expressed in term of percentage[1]. It can be determined using following equation.

$$\text{Frequency} = \frac{\text{Number of quadrats in which species occurred}}{\text{Total Number of quadrats studied}} x\ 100$$

For the convenience of comparison of Wild Ass population on one hand and the per cent cover on the other hand for any of the fringes, four categories of their values were developed that put both, Wild Ass population and per cent over on the comparable scale (Table-2).

Table-1: Daubenmire classes for assessing vegetation cover

Cover Class	Range of Coverage	Midpoint of Range
1	0-5%	2.5%
2	5-25%	15.0%
3	25-50%	37.5%
4	50-75%	62.5%
5	75-95%	85.0%
6	95-100%	97.5%

Sources: Daubenmire (1959).

Table-2: Categories of Wild Ass population and per cent cover of grasses and sedges.

Categories	Wild ass numbers	Plant per cent cover
Low	1-50	0-10
Moderate	51-100	10-20
High	101-150	20-40
Very High	> 150	> 40

Results and discussion

A total of 33 species of grasses and 4 species of sedges were recorded in the LRK during the study (besides 108 species of forbs)[9]. Of these, 7 species of grasses (*Aeluropus lagopoides*, *Chloris barbata*, *Aristida adscensionis*, *Eragrostis ciliaris, Cenchrus ciliaris, Desmostachya bipinnata* and *Sporoblus coromandelianus)* and 2 species of sedges (*Cyperus bulbosus* and *Cyperus rotundus*) were found to constitute main natural food of Wild Ass on a confirmed basis[2,5]. The per cent cover and frequency of these grasses and sedges are shown in Table-3.

Interrelationship between the Wild ass and grasses and sedges used as natural fodder plants: Wild Ass Population Census-2014 has shown that among all the fringes, highest number (n=1,268) of Wild Ass was recorded on the southern fringe followed by those on western fringe (n=846) and eastern fringe (n=710). The reason for the highest population of Wild Ass on the southern fringe has been known to be the presence of Narmada Canal along the entire fringe that has led to the proliferation of agriculture crops and drinking water availability. However, it is also known that only crops do not constitute the diet of Wild Ass. The *Equid* is also known to feed primarily on wild grasses and sedges[7,2]. Indeed, these plants are the main natural food-plants for Wild Ass and unlike crops they are the natural elements of the Rann ecosystem.

Table-3: Per cent cover and frequency of grasses and sedges.

Grasses/sedges species	Per cent Cover	Frequency (%)	Grasses/sedges species	Per cent Cover	Frequency (%)
Aeluropus lagopoides	6.63	21.15	*Aristida adscensionis*	2.06	16.02
Chloris barbata	0.12	0.52	*Eragrostis ciliaris*	0.11	1.92
Cenchrus ciliaris	0.10	0.64	*Cyperus bulbosus*	0.65	11.53
Sporobolus coromandelianus	0.43	5.77	*Cyperus rotundus*	0.86	2.56
Desmostchya bipinnata	0.54	5.77			

The southern fringe has been supporting higher population of Wild Ass as compared to the other fringes (i.e., 44% higher than that on the western fringe and 49% higher than that on the eastern fringe). Therefore, the status (in terms of per cent cover and frequency) of Wild Ass's main natural food, i.e. grasses and sedges should also be good on the southern fringe to support the food requirement of high Wild Ass population as crop alone cannot support Wild Ass's food requirements and crop dependency also leads to man-animal conflicts. During the present study it was premised that if the values of per cent cover and/or frequency of grasses and sedges used as main natural food by Wild Ass on the southern fringe would be lower than those on the other two fringes despite relatively higher population of Wild Ass on the Southern fringe (as compared to that on other fringes), it might be the indication of undesirable ecological situation as a result of considerable depletion of grasses and grass-like vegetation owing to the grazing activity by Wild Ass and/or livestock. For assessing this presumption, frequency and per cent cover grasses and sedges used as natural food by Wild Ass were measured along the pre-established transects on all the fringes. Its major findings are as follows: i. Considering the per cent cover of grasses and sedges collectively, the southern fringe had very low per cent cover (i.e., 10%), which was very close to the collective per cent cover of grasses and sedges on the western fringe (9.5%). Moreover, considering the per cent cover of grasses alone (i.e., by excluding the per cent cover of sedges), the Southern fringe had the lowest per cent cover (i.e., 7.86%) as compared to the per cent cover of grasses alone on the eastern fringe (12.86%) and western fringe (along with northern fringe; i.e., 8.82%). The lowest per cent cover of the grasses and sedges on the southern fringe reflected the adverse impact of grazing pressure by Wild Ass and/or cattle. It indicates that highest population of Wild Ass on the southern fringe in combination with high number of livestock might have led to the over-grazing of grasses and sedges leading to the lowest per cent cover. ii. It was also revealed that though the southern fringe supported the highest number of Wild Ass (i.e., 1,268 individuals)[6], frequency of occurrence of grasses and sedges (used as main natural food by Wild Ass) had been the lowest (7%) as compared to that on the eastern fringe (8%) and the western fringe (8.5%). It was further revealed that frequency of occurrence of natural herbs (forbs) other than grasses/sedges that might be used as natural food by Wild Ass was also the lowest (14.15%) on the southern fringe as compared to that on the eastern fringe (35.86%) and the western fringe (40.62%). Lowest frequency of occurrence of the grasses and sedges on the southern fringe indicated that these natural food resources of Wild Ass might be patchily distributed on the southern fringe, which in turn, might become a cause for migration of Wild Ass into the croplands that happen to fall in between two successive patches of natural herbs.

Conclusion

The study revealed that the grasses and sedges that constitute the main natural food of the Indian Wild Ass has been in depleted state on the southern fringe as reflected in the lowest values of per cent cover and frequency of these herbaceous plants on the southern fringe. The depletion might be due to over-grazing by cattle and/or high population of Wild Ass itself. Unfortunately, this is the fringe where Wild Ass had been recorded in the highest numbers among all the fringes. So, in absence of the adequate cover and frequent presence of grasses and sedges Wild Ass might get diverted to the crops as a dependable food supply. This may, in turn, would lead to increased man-animal conflicts.

Recommendations: As The Indian Wild Ass (*Equus hemionus khur*) is a Schedule-1 species as per the Wildlife (Protection), Act, 1972, for its effective conservation, restoration of grass cover and that of grass-like plants on the southern fringe is recommended as a step.

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