

Food of the Greylag Goose, *Anser anser* Linnaeus (Anseriiformes : Anatidae)

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Abstract

The food of the Greylag Goose, *Anser anser* L. (Anseriiformes : Anatidae) was studied during the shooting season from November 1982 to April 1983 at Hokarsar (34° 06' N and 74° 05' E ; 1584 m A.M.S.L.) an important wetland reserve. Twenty-four geese were obtained during the season and their gut contents analysed. Temporal variations were recorded in the frequency of occurrence and weight and volumes of the food intake in response to change of food availability and feeding places. During November and December the geese showed a marked preference for the seeds of *Trapa natans* while during February to April young shoots and roots of *Typha angustata*, *Butomus umbellatus*, *Nymphoides peltatum*, *Sparganium ramosum* formed the chief dietary items. Weather conditions were seen to be a very important factor as it influenced the composition of the food.

Key words : Feeding habits , greylag goose, Hokarsar, gut contents, *Trapa natans*, weather conditions.

1. Introduction

The numerous wetlands of the valley of Kashmir provide an extensive habitat for a large number of resident and non-resident birds especially waterfowl, ducks and geese. During the winter months when a large number of non-resident birds are on their long flights from as far as Siberia¹, these provide an excellent cover and attractive roosting, breeding and feeding grounds. Some of the important winter visitors are the Mallard (*Anas platyrhynchos*), Pintail (*Anas acuta*), Common Teal (*Anas crecca*), Wigeon (*Anas penelope*), Gadwall (*Anas strepera*), Shoveller (*Anas clypeata*), Greylag Goose (*Anser anser*), and Tufted Duck (*Aythya fuligula*). Besides, the wetlands

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form permanent homes for the Dabchick (*Podiceps ruficollis*), Grey Heron (*Ardea cinerea*), Pond Heron (*Ardea grayii*), kingfishers and many others.

The Greylag Goose, *Anser anser*, is the only goose wintering in the wetlands of Kashmir. The birds start arriving at various wetlands like Hokarsar, Hygam and Shallabugh in Kashmir in September and stay as long as the end of March or first week of April. During this period, they feed actively on various aquatic plants available in the wetland and live in association with other birds. There do not appear to be any systematic studies on the food and feeding habits of the goose and the present paper describes the food spectrum of the bird during its resting period at one of the important wetlands of Kashmir, *i.e.*, Hokarsar.

2. Study area

Hokarsar ($34^{\circ} 6' N$ and $74^{\circ} 05' E$; 1584 m A.M.S.L.) an important wetland reserve managed by the Directorate of Wildlife, J & K Government, is situated in the centre of the valley about 10 km to the west of Srinagar. The wetland is weedy and extensive morass, more or less semicircular in outline, extending in an east-west direction with a surface area of about 9.0 sq. km. (fig. 1). The wetland is characterized by a rather

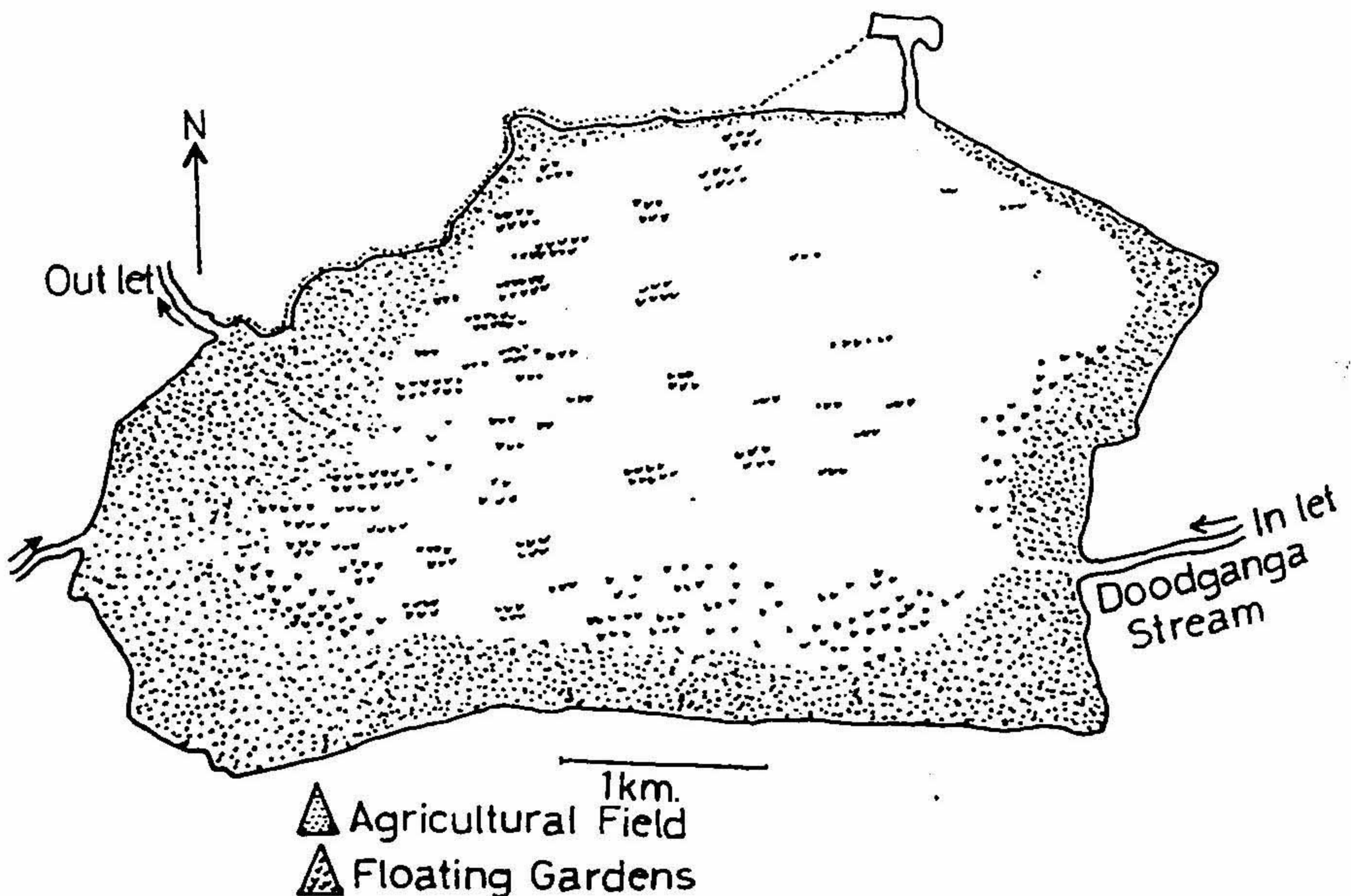


FIG. 1. Map of Hokarsar, wetland reserve.

low water level that fluctuates greatly through the seasons of the year in response to the discharge from the perennial Doodganga stream, from which there is great influx of heavy load of silt and nutrients. A single outlet on the northwest side connects the wetland with River Jhelum.

A thick willow belt (*Salix* sp.) with scattered stands of *Populus* trees extends along the sides of the wetland. The dominant macrophytes of the wetland include—*Saccharum spontaneum*, *Typha angustata*, *Butomus umbellatus*, *Phragmites communis*, *Myriophyllum verticillatum*, *Sagittaria sagitifolia*, *Trapa natans*, *Sparganium ramosum*, *Nymphoides peltatum*, *Eleocharis palustris*, *Potamogeton* sp. and *Polygonum* sp. Besides providing an efficient habitat for the birds most of these aquatic plants are a great source of fodder for the cattle and are, therefore, regularly harvested during the summer.

The wetland is surrounded on all sides by paddy fields and excess water from these washes down paddy grains and organic and inorganic wastes into the wetland. The Hokarsar wetland is declared open for shooting under license from November/December to April every year and the birds are shot from eleven butts spread all over the wetland.

3. Material and methods

Twenty-four Greylag Goose were obtained during the shooting season (November 1982-April 1983). About 80% of all birds were shot between 0900 and 1100 hr. The guts were removed by the technique of Harrison² and preserved in 5% formaldehyde solution. Each gut was dissected and the contents of the oesophagus, gizzard and rectum washed separately in a set of sieves and sorted into organic and inorganic components. The plant matter was hand-sorted under stereoscopic microscope and identified as accurately as possible by comparing its characteristics with those of the plants collected from the area. The volume of each species was calculated by water displacement method in graduated cylinders and their weight recorded after drying on a blotting-paper. Frequency of each species in the diet was also recorded. Any item of food less than 0.01 ml in volume and 0.0050 g in weight was referred to as a trace only and used in the frequency of occurrence tabulation.

The study area was divided into five units. Within each unit the population of birds was estimated approximately once every two weeks by visual census and transect method^{3,4}. Field binoculars of 10 × 50 and 20 × 50 magnification were used for counting.

Observations on feeding behaviour of goose were made from the hunting butts mainly in November, December and February.

4. Results

The Greylag Goose starts arriving in the premises of the wetland in September and feeds in large flocks in association with many surface feeding ducks. The flocks tend to remain large till late December when food appears to be most localized. The largest flocks were found on the thick cover of *Trapa natans* during late autumn (November) to early winter (December) and on floating gardens on northwest during late winter and early spring (February–April). In response to changes in food availability from January onwards the birds started to feed mainly on the newly growing shoots and roots of plants like *Phragmites communis*, *Typha angustata*, *Oryza sativa*, *Butomus umbellatus*, *Nymphoides peltatum* and *Sparganium ramosum* (Table II).

The geese fed differently on land and in water. When feeding on long shoots of *Typha angustata*, *Butomus umbellatus* and *Sparganium ramosum*, they held their heads almost horizontally, tore off the leaves and delicate shoots. Leaves of *Butomus umbellatus* as long as 25 cm were found in the oesophagus. When grazing on shorter vegetation on land and floating gardens, the bird pecked rapidly, breaking off several leaves at a time. The seeds were taken by dabbling and dipping methods. The proportion of geese adopting various feeding postures is shown in fig. 3. The geese used bill movements to extract the bigger seeds (*Trapa natans*). The seeds were held lengthwise in the bill and turned by the tongue against the sharp edges of the bill

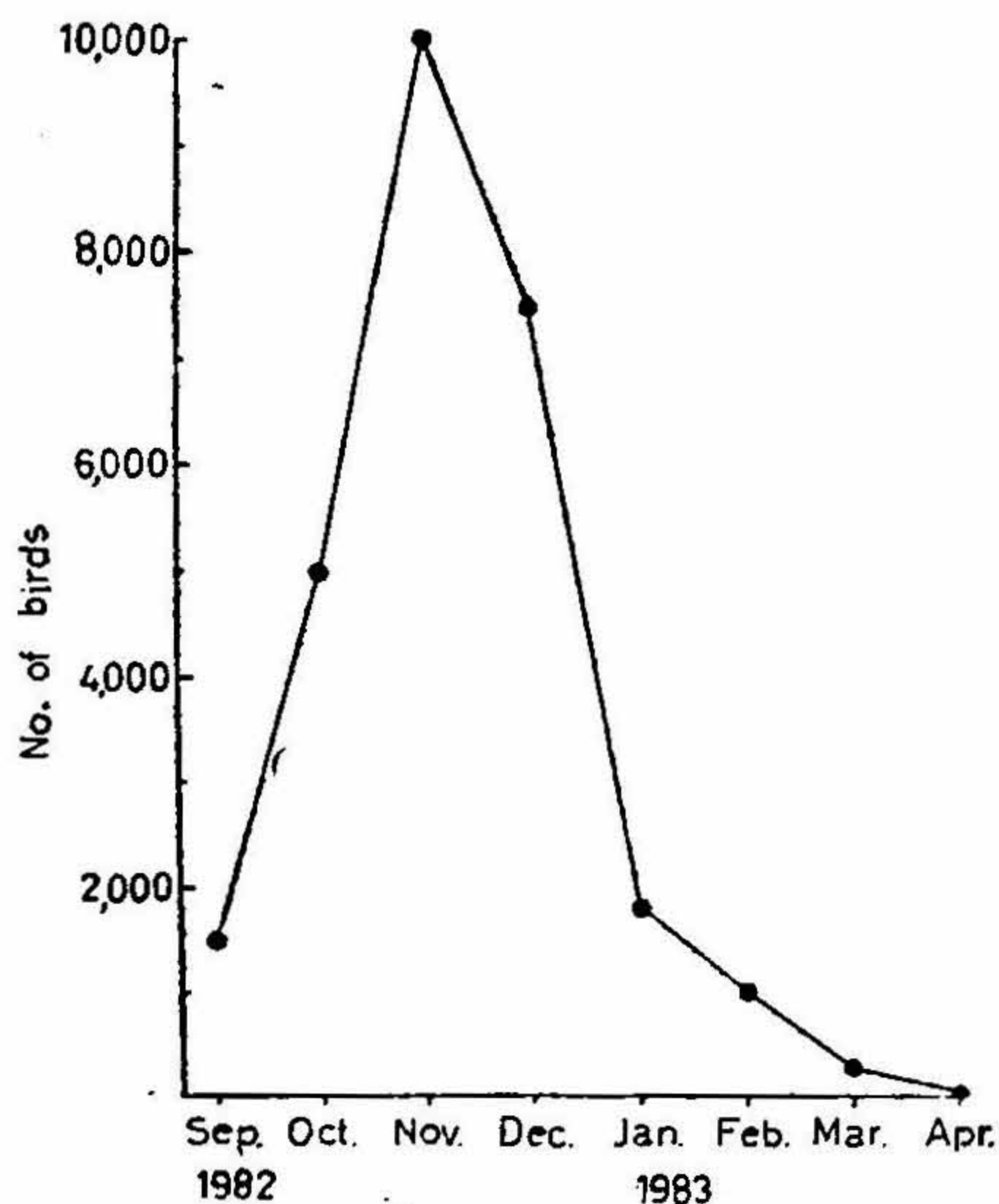


FIG. 2. Estimated population of the Greylag Goose at Hokarsar.

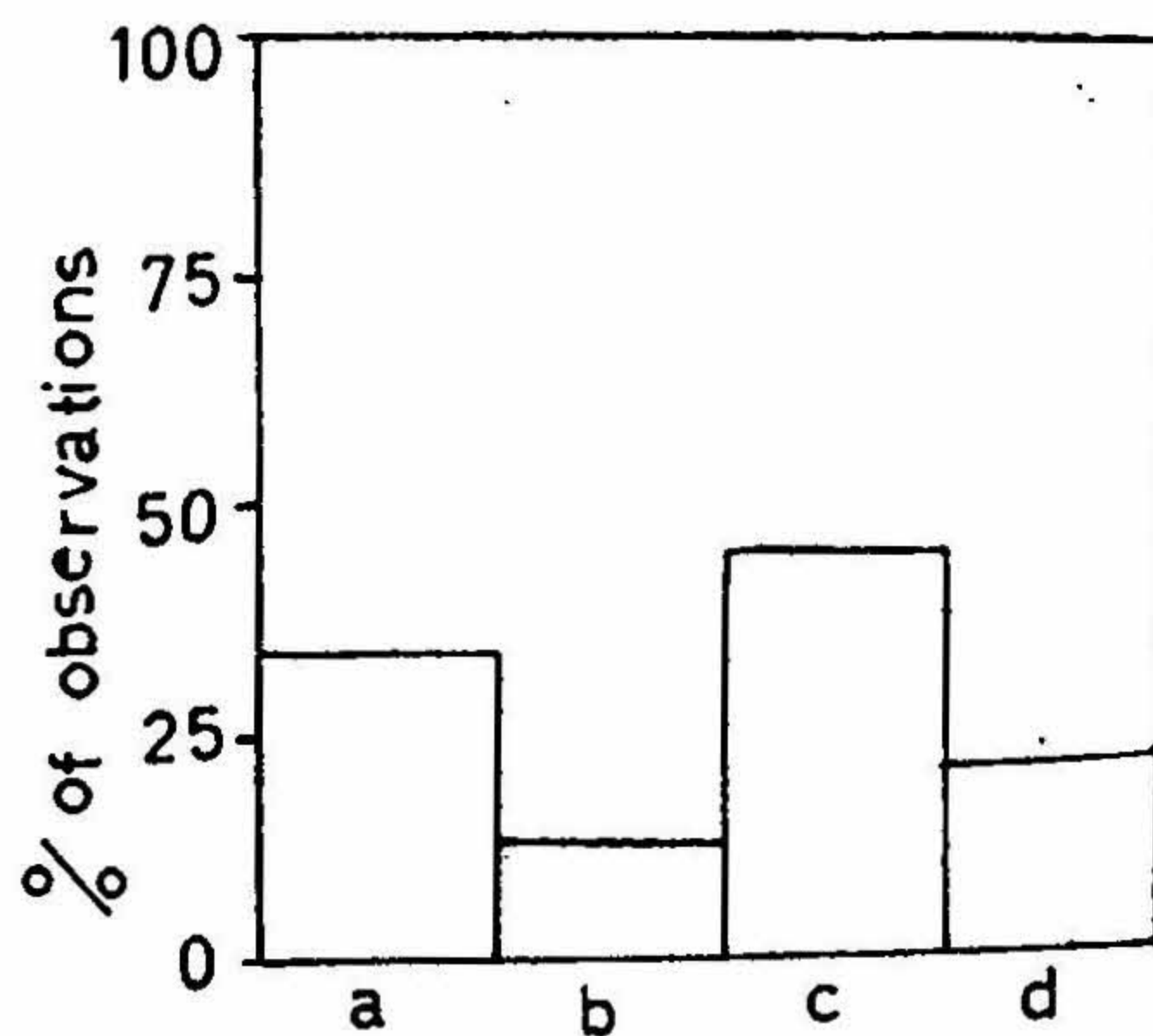


FIG. 3. Feeding methods and postures employed by the Greylag Goose.

- a = Grazing on land/floating gardens.
- b = Picking up food from the water surface.
- c = Dabbling with bill in shallow water.
- d = Dipping with head submerged.

and the outer hard seed cover was peeled off before swallowing it. The geese are pure herbivores and the food spectrum included nineteen species of various plants belonging to 14 families. The dietary items recovered from the gut contents of the birds comprised seeds/fruits, leaves and pieces of stem and roots. The proportion of various food species in the guts are given in Table I. There were no obvious differences in food consumption between the sexes.

Seeds of ten species belonging to seven families were recorded from 83.3% of guts and formed 92.25% (329.18 g) of the total food by weight and 92.53% (317.44 ml) by volume. *Trapa natans* (Trapaceae) was recorded in 58.3% of guts and formed 76.85% (274.25 g) and 77.31% (265.20 ml) of the total food weight and volume, respectively. *Phragmites communis* (Gramineae) recorded in 54.2% of the guts, formed 13.58% (48.46 g) of food weight and 13.53% (46.32 ml) of food volume. Except for *Trapa natans* and *Phragmites communis*, no other seed item was recorded in more than 40% of the birds and their contribution also was very low (< 4.0% of total weight and volume).

Apart from seeds which formed the chief food item for these birds, stem, leaves and roots of some plants were also recorded in their guts.

Leaves and stem of eleven species belonging to ten families were found in 95.9% of guts but contributed only 4.27% (15.24 g) of food by weight and 4.07% (13.93 ml) of food by volume. As far the proportion of item and leaf content in the food was concerned, *Typha angustata* (Typhaceae) was the most popular item of the diet having been consumed by 66.7% of the birds, with a total weight and volume of 3.07 g and 3.0 ml respectively. The stem and leaf content of other ten species was recorded in less than 34% of birds shot.

The roots of five plant species were found in 15 guts and formed 3.48% (12.44 g) of food by weight and 3.40% (11.66 ml) by volume.

5. Discussion

Food selection by birds is a complex process which involves many variables and many geese species have been reported to select food items from a mixture.^{5,6} Although one or the other part of as many as 19 plant species were recorded in the gut contents of Greylag Goose shot at Hokarsar wetland, only a few of them comprised the major food items of these geese. The data revealed that the geese changes its feeding habits with season during its stay at the wetland. From November to December main food items of the geese were seeds/fruits of *Trapa natans* and the other plant species contributed less than 20% of the food consumed. But thereafter the geese experienced a scarcity of the principal food, *Trapa natans*, probably due to its over-utilization in the

Table I

Analysis of the gut contents of the Greylag Goose

Food categories	Frequency	% of total freq.	Weight (g)	% of total wt.	Volume (ml)	% of total vol.
Fruits/Seeds						
<i>Tropha natans</i>	14	58.3	274.25	76.85	265.20	77.31
<i>Phragmites communis</i>	13	54.2	48.46	13.58	46.32	13.53
<i>Myosotis caespitosa</i>	9	37.5	0.18	0.05	0.12	0.03
<i>Polygonum amphibium</i>	6	25.0	0.46	0.13	0.41	0.12
<i>Scripus triqueter</i>	5	20.9	0.37	0.10	0.32	0.09
<i>Oryza sativa</i>	5	20.9	4.06	1.14	3.79	1.12
<i>Sparganium ramosum</i>	4	16.7	0.35	0.10	0.30	0.09
<i>Triticum aestivum</i>	3	12.5	1.02	0.28	0.93	0.27
<i>Hordeum vulgare</i>	2	8.3	0.03	+	0.03	+
<i>Scirpus sp.</i>	1	4.1	t	+	t	+
Fruit/seed totals	20	83.3	329.18	92.25	317.42	92.53
Leaves/Stem						
<i>Typha angustata</i>	16	66.7	3.07	0.86	3.00	0.87
<i>Butomus umbellatus</i>	8	33.3	2.93	0.82	2.57	0.75
<i>Agrostis stolonifera</i>	8	33.3	0.98	0.27	0.92	0.27
<i>Trifolium repens</i>	7	29.1	1.03	0.29	0.97	0.28
<i>Galium tricornne</i>	7	29.1	1.03	0.29	0.92	0.27
<i>Oryza sativa</i>	6	25.0	3.07	0.86	2.95	0.86
<i>Nymphoides peltatum</i>	5	20.9	1.39	0.39	1.05	0.30
<i>Phalaris arundinacea</i>	4	16.7	0.90	0.25	0.81	0.23
<i>Sparganium ramosum</i>	3	12.5	0.73	0.20	0.69	0.20
<i>Alisma plantago aquatica</i>	2	8.3	0.10	0.02	0.05	0.01
<i>Rannunculus sp.</i>	1	4.1	t	+	t	+
Leave/Stem totals	23	95.9	15.23	4.27	13.93	4.07
Roots						
<i>Typha angustata</i>	13	54.2	2.15	0.60	2.05	0.60
<i>Butomus umbellatus</i>	6	25.0	7.53	2.11	7.08	2.06
<i>Nymphoides peltatum</i>	4	16.7	2.21	0.62	2.09	0.60
<i>Alisma plantago aquatica</i>	2	8.3	0.52	0.15	0.42	0.12
<i>Sparganium ramosum</i>	2	8.3	0.03	+	0.02	+
Root totals	15	62.5	12.44	3.48	11.66	3.40

Total food weight = 356.86 g

Total food volume = 343.01 ml

+ = < 0.01%

Average of 14.87 g/gut.

Average of 14.3 ml/gut.

‡ = < 0.0050 g and < 0.01 ml.

Table II

Food spectrum of Greylag Goose at Hokarsar (%)

Food item	Season	
	November–December (13 birds)	January–April (11 birds)
<i>Trapa natans</i>	85.50	7.50
<i>Phragmites communis</i>	6.50	17.75
<i>Oryza sativa</i>	3.50	10.25
<i>Typha angustata</i>	1.50	20.25
<i>Butomus umbellatus</i>	...	21.25
<i>Nymphoides peltatum</i>	1.50	10.25
<i>Sparganium ramosum</i>	0.5	7.75
Rare food items	1.0	5.0

preceding months. Food availability and the cold weather have been reported to be likely external factors influencing the Mallard condition.⁷ Although the Greylag Geese are able to survive very low temperatures, some of them are forced to leave the Hokarsar on account of shortage of their preferred food item. Some of the birds migrate to other nearby feeding grounds—Hygam, Mirgund and Shallabugh wetlands for a short while, whereas some others leave the valley altogether for the season on their long migration further south to the plains of India. This is substantiated by the data obtained from a survey of the geese conducted during the present study (fig. 2). The geese that still remained at the wetland switched over to other food items like *Phragmites communis*, *Sparganium ramosum*, *Butomus umbellatus*, *Oryza sativa* and *Typha angustata*.

The geese usually feed in marshy situations. It has been suggested that the presence of water is very important to feeding birds^{8,9}, geese need water to drink and for preening during the day. Of the various wetland reserves of the valley, Hokarsar is of prime importance as a winter habitat for waterfowl. The holding capacity of the wetland is dependent upon several factors of which the availability of suitable water level to maintain its marshy nature and thus flourish the growth of suitable food plants of the geese is of prime importance. The wetland suffers from the great fluctuations in the water level as also from the huge amounts of silt brought into it by the feeding channel

Doodganga. Both these affect the plant growth and biomass in the wetland and hence control the geese population in the wetland.

The silting process in Hokarsar has reached such dimensions that it is posing a direct threat to the life of this important wetland. Intensive harvesting of *Typha angustata* and *Sparganium ramosum* for making mats, *Phragmites communis* and *Nymphoides peltatum* for fodder and the seeds of *Trapa natans* for making flour also affect the holding capacity of the Hokarsar. Controlled harvesting of these plants could probably lead to the delay in the departure of these geese which leave the wetland in the middle of the winter because of food shortage.

In view of its importance as one of the few remaining natural habitats for a variety of game birds, including the Greylag Goose, there is an urgent need for the integrated ecological development of this wetland.

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References

1. ALI, S. *The book of Indian birds*, 11th ed., The Bombay Natural History Society, Bombay, India, 1979.
2. HARRISON, J. G. A technique for removing wildfowl viscera for research, 11th Ann. Rep., Wildfowl Trust, 1960.
3. WATSON, A. A population study of ptarmigan (*Lagopus mutus*) in Scotland, *J. Anim. Ecol.*, 1965, 34 (1), 135-172.
4. GASTON, A. J. Methods for estimating bird populations, *J. Bom. Nat. Hist. Soc.*, 1975, 72 (2), 271-283.
5. OWEN, M. Some factors affecting food intake and selection in White-fronted Geese, *J. Anim. Ecol.*, 1972, 41, 79-92.
6. PREVETT, J. P., MARSHALL, I. F. AND THOMAS, V. G. Fall foods of Lesser Snow Geese in the James Bay region, *J. Wildl. Manage.*, 1979, 43 (3), 736-742.

7. OWEN, M. AND
COOK, W. A. Variations in body weight, wing length and condition of Mallard, *Anas Platyrhynchos* and their relationship to environmental changes, *J. Zool.*, 1977, 183 (3), 377-395.
8. PHILIPPONA, J. AND
MULDER, T. H. Het Vorkomen van de Europese Kolgans in het bijzonder in Nederland, *Limosa*, 1960, 33, 9-127.
9. KEAR, J. Feeding behaviour of White-fronted Geese in the British Isles, Unpubl. Rept., Wildfowl Trust, 1966.