

## The plant species eaten by hazel grouse in the southern part of the Russian Far East

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### ABSTRACT

In the southern part of the Russian Far East, at least 140 plant species were utilized as food by hazel grouse, including about 40 species of trees, 45 species of shrubs, 7 species of liana and around 55 species of herbs. Both foliar and flower buds, and shoots were eaten in autumn and winter (second half of October to mid-April). Sprouting buds, shoots and green leaves were eaten mainly in spring and summer (April to July), and rarely in autumn (September to November). Needles of evergreen coniferous trees were eaten also rarely in winter. Fruits, berries and seeds were eaten in summer and autumn (May to October). Of buds eaten, main species were *Salix* spp., *Betula* spp., *Acer* spp., *Chosenia arbutifolia*, *Alnus hirsuta*, *Carpinus cordata*, *Corylus* spp., *Lonicera* spp. and so on. Of liana, fruits of *Actinidia* sp. and *Vitis amurensis* were eaten most often. The diversity of plant species found in crops and gizzards is larger in the southern part of the Russian Far East than in Europe.

**Key words :** *Bonasa bonasia*, food, hazel grouse, plant, Russia

### Introduction

In the southern part of the Russian Far East, hazel grouse *Bonasa bonasia* occur in various forest types from sea coast to high elevations of the Shikhte-Alin Mountains. They rely on various kinds of plants as food throughout the year (Bergmann et al. 1982, Bergmann & Klaus 1994). Plant species eaten by hazel grouse might differ in different areas within their wide range from Scandinavia to the Far East because of regional variations in the species composition of plants

available and more plant species might be eaten by hazel grouse because of great species richness of the flora in the southern part of the Russian Far East. Studies have been published previously on the ecology, and especially food habits of the species. Some of them described species composition in diet and its seasonal changes in this area (Luchnik & Nadetskii 1938, Belopl'skii 1955, Nechaev 1968, Mikhailovskii, 1969, 1972, Mikhailovskii & Skryabina 1970, Polivanov & Polivanova 1971). In these previous studies, however, the numbers of species or genus of plants

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eaten by hazel grouse are not so many and a comprehensive list of plants eaten by the species has not been known in the Far East.

This paper describes the vascular plants (gymnosperms and angiosperms), including the parts of each species, eaten by hazel grouse in the southern part of the Russian Far East.

### Materials and methods

Plant species and parts of each plant species eaten by hazel grouse were determined by analysis of crop and stomach contents, or by direct observations of foraging birds in their habitats. Crop and stomach samples were obtained from approximately 300 birds shot from 1962 to 1995 in mainly deciduous broad-leaved forests and mixed forests of deciduous broad-leaved and coniferous trees in the southern part of the Russian Far East throughout the year, mainly during the hunting season from September to March. Observations of foraging birds were conducted in similar types of forests during the same study period. In addition, the results were supplemented by data derived from literature mentioned above.

Scientific name of plants followed "Classification of plants in Primorye and Priamurye" (Vorob'ev *et al.* 1966).

### Results

At least 140 species were utilized as food by hazel grouse, including about 40 species of trees, 45 species of shrubs, 7 species of liana and around 55 species of herbs (Table 1). Species composition and relative abundance of food items in crop and gizzard contents varied throughout the year depending on seasonal changes of food availability. Both foliar and flower buds, and shoots were eaten in autumn and winter (second half of October to mid-April). Sprouting buds, shoots and green leaves were eaten mainly in spring and summer (April to July), and rarely in autumn (September to November). Needles of evergreen

coniferous trees were eaten also rarely in winter. Fruits, berries and seeds were eaten in summer and autumn (May to October).

Of the buds eaten, the main species were *Salix* spp., *Betula* spp., *Acer* spp., *Chosenia arbutifolia*, *Alnus hirsuta*, *Carpinus cordata*, *Corylus* spp., *Lonicera* spp. and so on. Of liana, fruits of *Actinidia* spp. and *Vitis amurensis* were eaten most often. Flower buds of *Salix* spp., *Betula* spp., *Alnus* spp., *Corylus* spp., *Ulmus* spp. and other deciduous broad-leaved trees were also eaten. Needles of evergreen conifers were taken only accidentally. Fresh fruits and berries of trees, shrubs and herbs were preferred, but dried ones were of secondary importance. Seeds of *Abies* spp. and *Picea* spp. were eaten rarely, and seeds of *Pinus koraiensis* accidentally.

### Discussion

The results show the ability of hazel grouse to utilize a variety of plant species throughout the year. It is well known that the hazel grouse is euryphagous and utilizes many kinds of plants as food. In Europe, the main food of the species is green plants in spring and summer, berries in summer and autumn, and buds and catkins of deciduous broad-leaved trees in autumn and winter (Donaurov 1947, Semenov-Tyan-Shanskii 1959, Ivanter 1962, Salo 1971, Ahnlund & Helander 1975, Zbinden 1979, Bergmann *et al.* 1982, Bergmann & Klaus 1994). Although the main diet is basically similar in both Europe and the Far East, there are differences in plant species eaten between the western and eastern parts of its geographical range. Of berries, for example, *Vaccinium* and *Empetrum* are important in Europe, but in addition to these species, fruits of liana such as *Vitis* and *Actinidia* comprise the main diet in southern parts of the Far East. Regarding buds and catkins, *Betula* and *Alnus* are primarily utilized in Scandinavia and *Carpinus*, *Corylus* and *Sorbus* are important in central Europe (Salo 1971,

Table 1. Plant species and their parts eaten by hazel grouse in the southern part of the Russian Far East. A= abundant (occurrence frequency 50-100%), C=common (10-50%), R=rare (&gt;10%), —=not observed.

Species	Foliar bud	Flower bud	Shoot	Leave	Flower	Fruit, berry, seed
<b>Tall trees</b>						
<i>Taxus cuspidata</i>	—	—	—	R	—	R
<i>Abies holophylla</i> , <i>A. nephrolepis</i>	—	—	—	R	—	R
<i>Picea ajanensis</i>	—	—	—	R	—	R
<i>Pinus koraiensis</i>	—	—	—	R	—	R
<i>Populus davidiana</i>	A	A	C	C	—	—
<i>Populus maximowiczii</i>	C	C	R	—	—	—
<i>Chosenia arbutifolia</i>	A	A	A	C	—	—
<i>Salix</i> spp. <sup>1)</sup>	A	A	A	A	—	—
<i>Alnus hirsta</i>	A	A	A	C	—	C
<i>Betula</i> spp. <sup>2)</sup>	A	A	A	C	—	C
<i>Carpinus cordata</i>	A	—	A	C	—	A
<i>Quercus mongolica</i>	C	—	C	C	C	A
<i>Ulmus laciniata</i> , <i>U. propinqua</i>	C	—	C	C	C	A
<i>Malus mandshurica</i>	A	—	A	C	C	A
<i>Sorbus amurensis</i>	C	—	C	C	C	A
<i>Micromeles atrifolia</i>	A	—	C	C	C	A
<i>Crataegus maximowiczii</i> , <i>C. pinnatifida</i>	C	—	R	R	R	A
<i>Cerasus maximowiczii</i> , <i>C. sachalinensis</i>	R	—	R	R	R	C
<i>Padus maackii</i> , <i>R. asiatica</i>	A	—	A	C	C	A
<i>Maackia amurensis</i>	—	—	—	—	—	R
<i>Phellodendron amurensis</i>	—	—	—	—	—	C
<i>Acer</i> spp. <sup>3)</sup>	A	—	A	R	R	R
<i>Tilia</i> sp.	R	—	—	—	—	—
<i>Kalopanax septemlobum</i>	—	—	—	—	—	R
<i>Syringa amurensis</i>	R	—	R	C	—	A
<b>Shrub</b>						
<i>Pinus pumila</i>	—	—	—	R	—	R
<i>Juniperus</i> sp.	—	—	—	R	—	R
<i>Salix</i> spp. <sup>4)</sup>	A	A	A	C	C	—
<i>Corylus heterophylla</i> , <i>C. mandshurica</i>	A	A	A	C	C	R
<i>Berberis amurensis</i>	—	—	—	R	R	C
<i>Ribes</i> spp. <sup>5)</sup>	R	—	—	R	R	A
<i>Spiraea</i> sp.	C	—	R	C	R	—
<i>Sorbaria sorbifolia</i>	C	—	R	C	R	—
<i>Rubus</i> spp. <sup>6)</sup>	—	—	—	R	R	A
<i>Rosa rosgosa</i>	—	—	—	—	—	R
<i>Rosa</i> spp. <sup>7)</sup>	—	—	—	—	—	A
<i>Cerasus grandulosa</i>	—	—	—	—	—	R
<i>Lespedeza bicolor</i>	—	—	—	R	R	C
<i>Empetrum nigrum</i>	—	—	—	—	—	A
<i>Euonymus</i> spp. <sup>8)</sup>	C	—	C	C	R	A
<i>Rhamnus dahurica</i>	R	—	R	R	R	C
<i>Echinopanax elatum</i>	—	—	—	—	—	R
<i>Acanthopanax sessiliflorum</i>	—	—	—	—	—	R
<i>Eleutherococcus senticosus</i>	—	—	—	—	—	C
<i>Aralia mandshurica</i>	—	—	—	—	—	R
<i>Chamaepericlymenum canadense</i>	—	—	—	—	—	A

Species	Foliar bud	Flower bud	Shoot	Leave	Flower	Fruit, berry, seed
<i>Theleycrania alba</i>	—	—	—	—	—	C
<i>Vaccinium vitis-idea</i>	—	—	—	—	—	A
<i>Vaccinium uliginosum</i>	—	—	—	—	—	A
<i>Rhododendron</i> sp.	R	R	R	R	—	—
<i>Oxycoccus quadripetalis</i>	—	—	—	—	—	A
<i>Sambucus sibirica</i>	R	—	R	R	—	A
<i>Viburnum burejaeticum</i> , <i>V. sargentii</i>	R	—	R	R	—	A
<i>Lonicera</i> spp. <sup>9)</sup>	C	—	C	C	C	A
<b>Liana</b>						
<i>Menispermum dahuricum</i>	—	—	—	—	—	R
<i>Schizandra chinensis</i>	—	—	R	R	R	C
<i>Celastrus flagellaris</i>	—	—	—	—	—	R
<i>Vitis amurensis</i>	—	—	C	C	C	A
<i>Actinidia kolomicta</i> , <i>A. arguta</i>	A	—	C	C	C	A
<i>Actinidia polygama</i>	C	—	C	C	C	A
<b>Herb</b>						
<i>Echinochloa</i> sp.	—	—	—	R	R	R
<i>Setaria</i> sp.	—	—	—	R	R	R
<i>Diarrhena</i> sp.	—	—	—	R	C	C
Gramineae (genus unknown)	—	—	—	R	R	R
<i>Carex</i> sp.	—	—	—	R	C	C
Cyperaceae (genus unknown)	—	—	—	R	R	R
<i>Arisaema amurensis</i>	—	—	—	—	—	R
<i>Luzula</i> sp.	—	—	—	C	R	R
<i>Gagea</i> sp.	—	—	—	C	C	R
<i>Asparagus schoberioides</i>	—	—	R	R	R	R
<i>Smilacina</i> sp.	—	—	—	—	—	A
<i>Majanthemum</i> sp.	—	—	—	—	—	A
<i>Disporum</i> sp.	—	—	—	—	—	R
<i>Polygonatum</i> sp.	—	—	—	—	—	R
<i>Convallaria keiskei</i>	—	—	—	—	—	R
<i>Viscum coloratum</i>	—	—	—	—	—	C
<i>Polygonum</i> spp. <sup>10)</sup>	—	—	R	R	R	C
<i>Stellaria radians</i>	—	—	C	A	A	R
<i>Paeonia</i> sp.	—	—	—	—	—	R
<i>Eranthis stellata</i>	—	—	C	C	C	C
<i>Actaea acuminata</i>	—	—	—	—	—	R
<i>Anemone amurensis</i>	—	—	C	A	A	C
<i>Ranunculus ussuriensis</i>	—	—	C	A	A	C
<i>Thalictrum</i> sp.	—	—	C	C	C	C
<i>Adonis amurensis</i>	—	—	A	A	A	C
Ranunculaceae (genus unknown)	—	—	C	C	C	C
<i>Caulophyllum robustum</i>	—	—	—	—	—	R
<i>Hylomecon vernalis</i>	—	—	C	C	C	C
<i>Corydalis</i> sp.	—	—	A	A	A	C
Cruciferae (genus unknown)	—	—	C	C	C	C
<i>Saxifraga</i> sp.	—	—	C	C	C	R
<i>Chrysosplenium</i> sp.	—	—	C	C	C	R
<i>Mitella nuda</i>	—	—	C	C	C	—
<i>Rubus arcticus</i>	—	—	—	—	—	C

Species	Foliar bud	Flower bud	Shoot	Leave	Flower	Fruit, berry, seed
<i>Fragaria orientalis</i>	—	—	C	C	C	A
<i>Geum aleppicum</i>	—	—	—	—	—	R
<i>Agrimonia</i> sp.	—	—	—	—	—	R
Rosaceae (genus unknown)	—	—	C	C	C	C
<i>Falcata japonica</i>	—	—	—	—	—	R
<i>Medicago</i> sp.	—	—	R	C	C	R
<i>Trifolium</i> sp.	—	—	R	C	C	R
<i>Lespedeza hedysaroides</i> , <i>L. stipulacea</i>	—	—	—	C	R	C
Liguminosae (genus unknown)	—	—	C	C	C	C
<i>Oxalis acetosella</i> , <i>O. obtriangulata</i>	—	—	R	A	C	C
<i>Impatiens noli-tangera</i>	—	—	C	C	A	A
<i>Viola</i> sp.	—	—	—	—	—	R
<i>Circaea</i> sp.	—	—	C	C	C	R
<i>Panax ginseng</i>	—	—	—	—	—	R
<i>Sanicula rubriflora</i>	—	—	—	—	—	R
<i>Aegopodium</i> sp.	—	—	C	C	C	—
Umbelliferae (genus unknown)	—	—	R	R	R	—
<i>Pirola</i> sp.	—	—	R	C	—	—
<i>Gentiana</i> sp.	—	—	R	C	—	—
<i>Lamium barbatum</i>	—	—	C	C	C	—
<i>Plantago</i> sp.	—	—	—	—	—	R
<i>Rubis</i> sp.	—	—	—	—	—	R
<i>Adoxa moschatellina</i>	—	—	C	C	C	—
<i>Artemisia</i> sp.	—	—	C	C	R	—
Compositae (genus unknown)	—	—	R	R	—	—

- 1) *S. caprea*, *S. rorida* and so on
- 2) *B. costata*, *B. shmidtii*, *B. lanata*, *B. dahurica*, *B. mandshurica* and so on.
- 3) *A. mandshuricum*, *A. tegmentosum*, *A. mono*, *A. pseudosieboldianum*, *A. barbinerve*
- 4) *S. gracilistyla*, *S. schwerinii* and so on.
- 5) *R. maximowiczianum*, *R. mandshuricum* and so on.
- 6) *R. crataegifolius*, *R. sachalinensis* and so on.
- 7) *R. davurica*, *R. acicularis* and so on
- 8) *E. sacrosancta*, *E. pauciflora*, *E. maximowicziana*, *E. macroptera* and so on.
- 9) *L. maackii*, *L. praeflorens*, *L. maximowiczii*, *L. edulis*, *L. gibbiflora*, *L. ruprechtiana*.
- 10) *P. sieboldii*, *P. aviculare* and so on.

Ahnlund & Helander 1975, Swenson 1993, Bergmann & Klaus 1994). In addition to these species, other species are also important in southern part of the Far East. Zhao (1977) and Yang (1993) reported 30 plants species as food in northeastern China. Of them *Salix*, *Populus* and *Acer* are eaten as much as *Betula* and *Alnus*. The diversity of plant species found in crops and gizzards is larger in the southern part of the Far East than in Europe. This may be the reflection of the greater species richness of the flora in this area.

Although the list of plants presented here is not final, and additional plant species will be supplemented by future studies on food habits of the species, we consider our results to be a nearly comprehensive list of plants utilized by hazel grouse in the southern part of the Russian Far East.

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## ロシア極東南部においてエゾライチョウが 食べる植物

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ロシア極東南部でエゾライチョウが食物として利用している植物は、高木約40種、灌木約45種、蔓植物7種、草本類約55種で、全体では少なくとも140種であった。冬芽、花芽、芽条は秋と冬(10月後半から4月中旬)に食べられた。展開中の葉、芽条、葉は主に春と夏(4~7月)、まれに秋(9~11月)に食べられた。常緑針葉樹の葉は冬にごくまれに食べられることがあった。果実類や種子は夏と秋(5~10月)に食べられた。冬芽が食べられた主な種は、*Salix* spp., *Betula* spp., *Acer* spp., *Chosenia arbutifolia*, *Alnus hirsuta*, *Carpinus cordata*, *Corylus* spp., *Lonicera* spp であった。蔓植物では *Actinidia* spp. と *Vitis amurensis* の果実がよく食べられていた。花芽では *Salix* spp., *Betula* spp., *Alnus* spp., *Corylus* spp., *Ulmus* spp. など食べられていた。果実類では新鮮なものは好んで食べられたが、乾燥したものはあまり好まれなかった。種子では *Abies* spp., *Picea* spp. がまれに、*Pinus koraiensis* はごくまれに食べられた。食べられる植物の種類数はヨーロッパにおけるより多かったが、これは極東南部の植物相の豊かさを反映したものである。

キーワード：Bonasa bonasia, 食物, エゾライチョウ, 植物, ロシア