

## 論文 (Original article)

# Food habits of the copper pheasant *Syrmaticus soemmerringii* in winter season

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### Abstract

The contents of 56 crops of the copper pheasant *Syrmaticus soemmerringii*, endemic to Japan, were analyzed. The crops were collected from 13 prefectures including Tokyo during the Japanese hunting seasons from mid-Nov. to mid-Feb., 1999 – 2002. Most of the food items were vegetable matter, and leaves were frequently found (82.1% of all crops), followed by the seeds or fruits (76.8%), stems (32.1%), flowers (12.5%) and roots (10.7%). Fifty-two plant species and unidentified species belong to seven genera were identified among the leaves. Fifteen kinds of ferns such as *Polystichum tripterum* and *Cyrtomium fortunei* were found from crops of many prefectures. Considering with some other previous analysis reports, fern species may be one of important foods for the pheasants in winter season. Among the seeds or fruits, *Phryma leptostachya* was found most frequently, followed by *Zanthoxylum ailanthoides*. The fallen leaves of larch *Larix kaempferi*, leaves and seeds of Japanese cedar *Cryptomeria japonica*, and twigs and dead leaves of Japanese cypress *Chamaecyparis obtusa* were found from some crop contents.

**Key words** : copper pheasant, crop content analysis, fern species, food habits, winter season

### Introduction

The copper pheasant *Syrmaticus soemmerringii* is endemic to and is a popular game bird in Japan. Japanese hunting law only permits hunters to shoot the male copper pheasant except in the case of one subspecies, *ijimae* that was distributed in mid- and southern Kyushu Island, which was designated as a near-threatened subspecies in Japan (Ministry of Environment, 2002). Though about 50,000 individual pheasants have been shot annually in recent years, the harvests have declined during recent decades, and there is a fear of a natural population decrease of pheasants in the wild (Kawaji et al., 2002). On the other hand, it is also well known that the copper pheasant is an important food for large raptors, Hodgson's hawk-eagles *Spizaetus nipalensis*, golden eagles *Aquila chrysaetos* and goshawks *Accipiter gentilis*, which inhabit the forest (Yamazaki, 1997). Therefore, keeping the wild pheasant population at an adequate level is related to good habitat management for those raptors.

We have few reports about the habitat preference of the copper pheasant in Japan. Kiyosu (1978) reported that the pheasants normally fed and drank water near small streams along dark and damp artificial coniferous forests such as Japanese cedar *Cryptomeria japonica* and Japanese cypress *Chamaecyparis obtusa* in the morning of winter,

then rested and had a sand bath in ridges and foots of the mountain during daytime. It is not clear, however, whether the pheasants preferred such artificial vegetation as a feeding area or used it as a shelter from predators mainly. If products from such vegetation were confirmed as foods of the pheasants, it would be ensure that they selected such habits as main feeding area.

The methods for investigating the food habits of birds include gut contents analysis, direct observation, and fecal analysis (e.g. Moreby, 1992). Crop content analysis is available for pheasants because the items remain in their natural forms, and it is easy to collect samples from hunters, especially during Japanese hunting season, from mid-Nov. to mid-Feb. annually. Actually there have been some reports of crop content analyses of individuals captured by hunting (e.g. Ogasawara, 1968, Tochigi Prefectural Citizens' Park Management Office, 1976), but the sample size in previous reports were so small and the study areas were very restricted, such as to one or a few prefectures. Some reports experimentally researched the food preference of the copper pheasant by providing various vegetable items to pheasants in a cage (e.g., Tochigi Prefectural Citizens' Park Management Office, 1978), but we were not able to obtain clear food preferences using that methodology.

We collected some crop contents from many

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prefectures, which were different from previous reports, and tried to clarify the characteristics of food habits in winter season in this paper.

### Materials and Methods

Fifty-six crops which were taken from captured individuals were sent to us by hunters in 13 prefectures during Japanese hunting seasons 1999 - 2002. The investigated crops were collected from Aomori (n=1), Iwate (12), Yamagata (1), Gunma (8), Tochigi (1), Tokyo (6), Chiba (8), Kanagawa (1), Yamanashi (6), Nagano (3), Okayama (5), Tottori (1) and Oita (3). The exact collection sites were not clear, but hunters usually harvest pheasants within the forest along streams. These were identified using the prefecture's name in this paper. Crop contents were sorted in the laboratory and identified to the species level if possible, but some items could not be identified to such a level, and were treated at a genus level. Food items were divided into vegetable and animal elements first, then vegetable items were divided into leaves, seeds and fruits, stems, roots, flowers and others. As sample sizes were different from prefectures and the vegetation data around the collection sites was unknown, occurrence rates of items in prefectures were not calculated, but only what kinds were appeared in each prefecture were described. The numbers of seeds and fruits were respectively counted, but for leaves, roots and stems, the numbers of parts were counted because the pheasants directly picked leaves from plants in the standing position, and if many parts of leaves from one plant existed in one crop, this would signify a preference for those plants. Animal elements were also identified and counted.

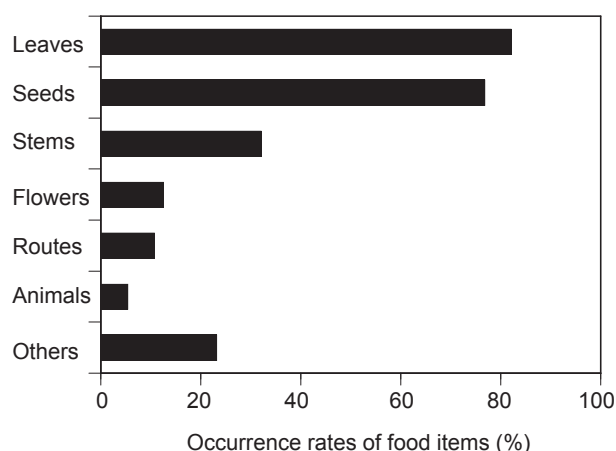


Fig. 1. Occurrence rates of samples with each food item in analyzed whole copper pheasant crops

### Results

The mean wet weight of these crop contents was 17.84 g (1.49 – 61.66 g in ranges). Animal elements, especially small insect bodies, were detected from only 5.4 % of all crops. But all crops included vegetable elements, and leaves were most frequently found in 46 crops (82.1% in 56), followed by seeds or fruits in 43 (76.8%), stems in 18 (32.1%), flowers in 7 (12.5%) and roots in 6 (10.7%) (Fig. 1). Fifty-two plant species and seven unidentified species belong to genera were identified as leaves, and *Polystichum tripterum* was the most collected in 14 of 46 crops, followed by *Carex* sp. in 13, *Polystichum* sp. in 12, and *Akebia trifoliata* in 9. Fifteen kinds of ferns were found from crops of 11 in 13 prefectures. *Polystichum tripterum* was most found in samples from 7 prefectures (Aomori, Iwate, Tokyo, Nagano, Okayama, Tottori and Oita), *Polystichum* sp. from 5 prefectures (Iwate, Tokyo, Chiba, Yamanashi and Okayama), *Cyrtomium fortunei* from 3 (Tokyo, Okayama and Oita), *Dryopteris erythrosora* from 3 (Tokyo, Yamanashi and Oita), *Blechnum niponicum* from 4 (Iwate, Tokyo, Okayama and Oita), *D. crassirhizoma* from 2 (Iwate and Gunma), *Coniogramme japonica* from 2 (Chiba and Kanagawa), *C. intermedia*, *Dennstaedtia hirsuta*, *Dryopteris lacera*, *D. bissetiana*, *D. sabaei*, *Thelypteris angustifrons*, *T. japonica*, *T. acuminata* from one prefecture (respectively Okayama, Iwate, Tokyo, Tokyo, Iwate, Oita, Okayama, Chiba). The fallen leaves of larch *Larix kaempferi* and Japanese cedar were found in 7 and 2 crops. Three parts of dead leaves of Japanese cypress were also found in one crop. Regarding the numbers of parts, 2,070 from *Polystichum tripterum* were found (32.9% of all accumulated parts), followed by *Carex* sp. (871, 13.9%), *Blechnum niponicum* (451, 7.2%), *Polystichum* sp. (438, 7.0%), *Trifolium repens* (419, 6.7%) and *Stellaria media* (228, 3.6 %) (Fig. 2).

Fifty species and six unidentified species belong to genera were identified as seed or fruits. *Phryma leptostachya* was found most frequently in 7 of 43 crops, followed by *Zanthoxylum ailanthoides* (6), *Quercus serrata*, *Carex* sp., *Castanopsis sieboldii*, *Rhus javanica* and *Wisteria floribunda* (5). There were 46 species found in less than three crops. In our count, 1,167 seeds of *Carex* sp. were found (15.5 % of all seed or fruit numbers), followed by 795 seeds of *Rhus javanica* (10.5 %) and 746 of *Stellaria media* (9.9 %) (Fig. 3). Six seeds of Japanese cedar were found in one crop. Stems from *Dioscorea japonica* and *Laportea bulbifera* were found in 5 and 2 of 18 crops, respectively. Three twigs of Japanese cypress were also found in 2 crops.

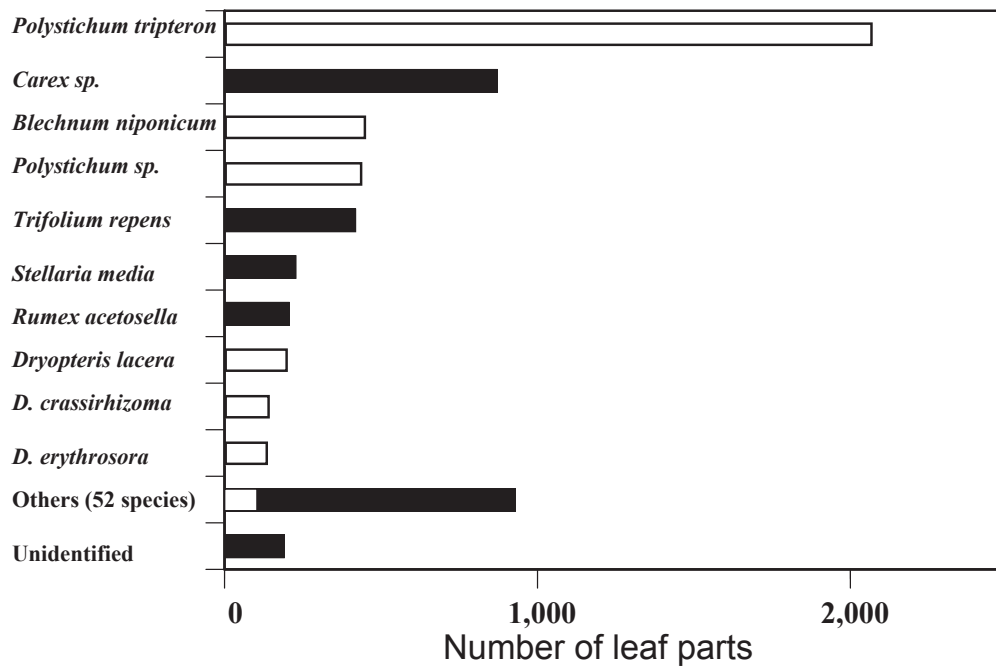


Fig.2. Number of leaf parts in crop contents. White rectangles show fern species and number of pieces which were counted in whole crop contents. Black ones show other vegetable kinds.

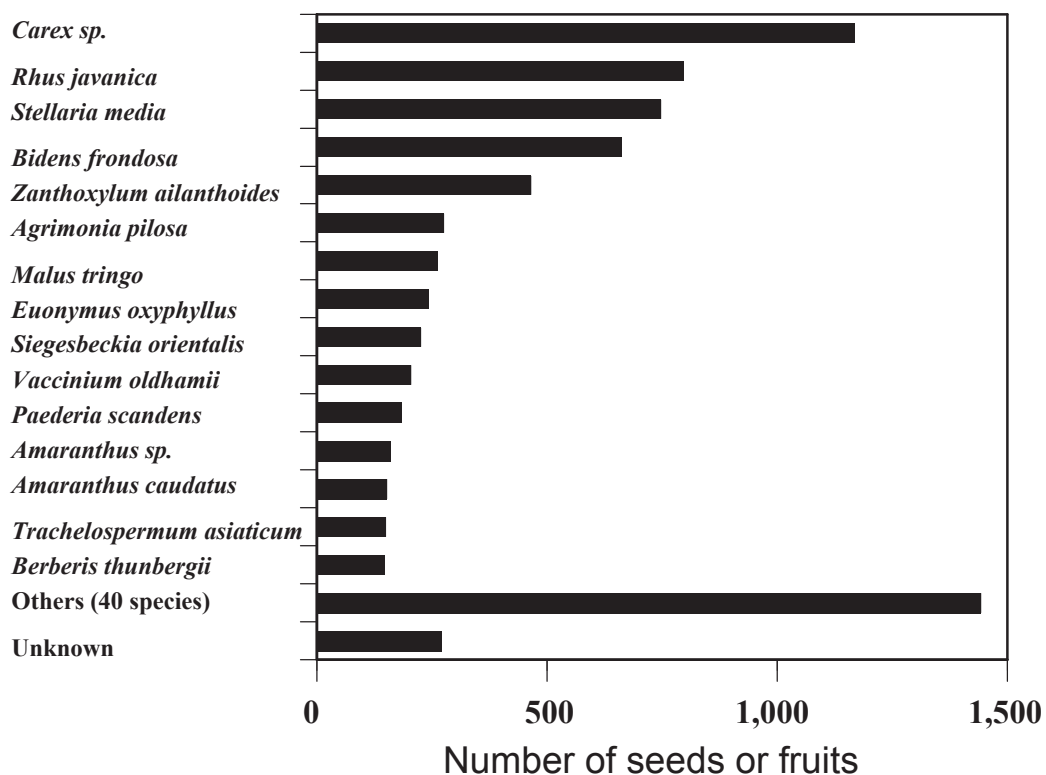


Fig.3. Species and number of seeds or fruits which were counted in whole crop contents

### Discussion

It was showed that the copper pheasant ate many vegetable items, especially the leaves of plants, more than other parts of plants or animal food items in winter season according to our study. This demonstrated that the habits were slightly different from that of the closely related green pheasant *Phasianus colchicus*, which preferred seeds and fruits rather than leaves, as Kiyosu (1978) found. In leaf items we found many ferns from crop samples of copper pheasants. Some ferns such as *Polystichum tripterum* grow in dark forests along stream with fertile soil (Numata et al. 1990). Our current samples might be mostly collected along small streams in forests. Therefore, our data showed that copper pheasants preferred ferns in such collection condition. But copper pheasants seek foods not only near stream but also far from stream, so the current data did not necessary to mean exact character of food habits in winter season. We sometimes observed that copper pheasants picked up many leaves included ferns in the forest except for near stream. If more samples from other collection sites such as ridges and hills can be analyzed, we will confirm more exact food preferences of copper pheasants in winter season. We and some hunters often looked some copper pheasants stayed near stream in whole daytime in the snow season, as Kiyosu (1978) reported. Furthermore, the pheasants would only find green vegetable items such as ferns near stream in the heavy snow areas. Even in districts with little snow, such as the southwest area, many fern species were found from many crop contents in our current study and we also have many observations. Ferns were found in 54 of 145 crops which were also collected from hunting in Kochi prefecture (Kojima & Wada, 1967), and 17 of 37 plant species that were collected by crop analyses included ferns, while there were also 96 species of seeds. Therefore, it is possible that we conclude that fern species will be one of main food items of copper pheasants in winter season, and might frequently walk around in a habitat in which ferns were common during this season such as stream in forest.

From Ogasawara (1968) seeds such as *Persicaria thunbergii* and *Achyranthes bidentata* were found in 5 crops collected in Miyagi and Akita prefectures in Tohoku district, and ferns were also found in 2. Many bamboo grasses and ferns were collected from many crops in Tochigi prefecture, and the main foods were green leaves such as bamboo grasses, ferns and *Akebia trifoliata* (Tochigi Prefectural Citizens Park Management Office, 1976). Seeds and nuts such as acorns, *Dioscorea japonica*, *Rhus ambigua*, *Paederia scandens* and *Ophiopogon japonicus* were also found as main food items of copper pheasants

from current data. Yamashina (1976) also reported that copper pheasants fed normally on the fatty nuts such as *Castanopsis cuspidata*, *Machilus thunbergii*, *Quercus glauca*, *Q. serrata*, *Cleyera ochracea* and *Castanea crenata* that lied on the forest floor. They might be the data of the foods of the pheasants in the broad-leaved forests of autumn season.

Tochigi Prefectural Citizens Park Management Office (1976) reported that there were more than 700 seeds of Japanese cedar from four crop contents of copper pheasant. We also found the existence of fallen leaves of larch, leaves and seeds of Japanese cedar, and twigs and dead leaves of Japanese cypress from our results. Therefore, some pheasants would use artificial vegetation as a feeding site.

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## 冬期におけるヤマドリの食性

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### 要 旨

日本固有種であるヤマドリの 56 個のそ嚢を解析した。そ嚢は、1999 年～2002 年の狩猟期（11 月中旬～2 月中旬）に 13 都府県から収集した。ほとんどの食物は植物質であり、全そ嚢数に占める出現割合は葉部がもっとも多く（82.1%）、次いで果実・種子部（76.8%）、茎部（32.1%）、花部（12.5%）および根部（10.7%）であった。葉部として 52 種および種の特定できない 7 属が同定された。ジュウモンジシダ *Polystichum tripterum* やヤブソテツ *Cyrtomium fortunei* といったシダ類が 15 種認められた。これまでに発表されたいくつかの食性分析報告と合わせると、ヤマドリにとってシダ類は冬期間における重要な餌資源の一つとなっていると思われる。果実・種子部では、ハエドクソウ *Phryma leptostachya* がもっとも多く、次いでカラスザンショウ *Zanthoxylum ailanthoides* の順であった。カラマツ落葉、スギの葉および実、ヒノキの小枝や落葉もそ嚢内容物から検出された。

キーワード：ヤマドリ、そ嚢内容物分析、シダ類、食性、冬期

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