

The Moor Vegetation of the Southern Lowland of Okayama Prefecture, S. W. Japan

by

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Introduction

The moor vegetation is mainly developed in the cool-temperate to the frigid region, but it occurs also in the more southern area when climatic and edaphic condition are favorable. Moors developing in the southern lowland of Okayama Pref., which is located in the warm-temperate zone, are characterized by occurrence of members of *Rhynchospora*, *Eriocaulon*, *Drosera* and *Utricularia*, and usually form no peat layer. About half of the components of the moor vegetation belong to the northern element, that is, they are common to those of bogs in northern regions, and the rest are of the southern element.

This paper deals with the vegetation of these moors and some interpretation of their ecological characteristics, based on the observations obtained during 1972 to 1978.

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I. Area investigated

The region studied is the southern half of Okayama Pref., between 133°30'

Table 1. Localities of investigated moors.

Locality	Altitude (m)	Geology	Date of invest.
1. Mt. Shōyōsan, Yakage-chō, Oda-gun	280	quartz-porphry	Oct. 1972
2. Nishikario, Kayō-chō, Jōbō-gun	380	granite	Oct. 1972
3. Mt. Hongūsan, Kamogawa-cho, Mitsu-gun	350	quartz-porphry	Oct. 1975
4. Mitoshinden, Tsudaka-cho, Mitsu-gun	240	granite	Oct. 1972
5. Mt. Hatogaiwasan, Tsudaka-chō, Mitsu-gun	220	granite	Oct. 1972
6. Nichiōji, Tsudaka-chō, Mitsu-gun	180	granite	Oct. 1972
7. Nanatsuike, Chayamachi-chō, Kurashiki (2 sites)	110 & 130	granite	Aug. 1978
8. Mt. Kinkōsan, Okayama	140	granite	Oct. 1972
9. Akasakaōike Akasaka-chō, Akaiwa-gun	50	granite	Sep. 1972
10. Sayama, Bizen-chō, Waki-gun (2 sites)	110 & 130	rhyolite	Sep. 1975
11. Mt. Ohirasan, Oku-chō, Waki-gun	20 & 100	rhyolite	Nov. 1974
12. Kugui, Bizen	20	rhyolite	Nov. 1974
13. Kakui Island, Hinase-chō, Waki-gun (3 sites)	5, 15 & 60	quartz-porpgyry	Aug. 1978

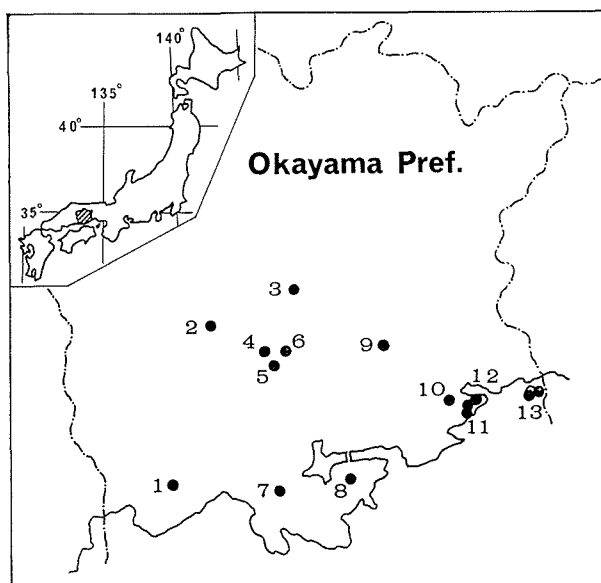


Fig 1. Map showing the localities investigated.

and 134°30' E longitude and between 34°30' and 35°N latitude.

Climate of the area is characterized by a relatively small amount of rainfall and a warm temperature. The annual total rainfall is about 1100 mm and the yearly mean temperature is between 13.8 to 15.6°C.

Geologically, the area predominantly consists of granite, rhyolite, quartz-porphry, paleozoic strata and quaternary alluvium. Moors develop only in areas of granite, rhyolite or quartz-porphry.

Secondary forests such as *Pinus densiflora* community and *Quercus serrata* community are predominant in this area, and the former is more widely distributed. In the coastal region, the *Pinus densiflora* forest becomes open and reduced in height because of unfavorable ecological conditions, such as strong human impact by repeated cut over or forest fire, small amount of rainfall, and deeply weathered "Masa" soil.

Localities of the investigated moors are shown in Fig. 1 and Table 1.

II. Method

In the present study were followed the general vegetation concept and methodology of the Z. M school of phytosociology (Braun-Blanquet 1964). In analysing the moor vegetation, sample plots were chosen only at the most typical segment of homogeneous community. All plant species in the plot including bryophytes were recorded and assessed for their dominance and sociability. In the laboratory, data of the sample plots were grouped and classified according to their floristic similarities and environmental affinities.

Nomenclature follows Ohwi (1975), Mizutani & Hattori (1969) and Iwatsuki & Noguchi (1973), for vascular plants, the Hepaticae and the Musci respectively.

III. Result

From the phytosociological records collected, the following three communities comprising four groups and eleven subgroups are distinguished in the moor vegetation of the area treated (Table 2).

1. *Rhynchospora brownii* community

This community is characterized by the presence of *Rhynchospora brownii*. It develops on a small landslide or marginal part of the moor, where the ground water table usually lies under the soil surface. It is rather rare in the Chugoku district, being limited to the coastal region. Forest or grassland elements such as *Dicranopteris dichotoma* and *Andropogon virginicus* are remarkable.

2. *Rhynchospora faberi* community

This community is characterized by the presence of *Rhynchospora faberi*. It develops on the sandy soil of deeply weathered granite areas, where are often observed impermeable layers and oozing water. From its floristic composition the community is classified into the following two groups.

(1) *Rhynchospora rubra* group

This group is the most remarkable community of the coastal region in this district, characterized by the presence of *Rhynchospora rubra*. It develops on the open steep slope facing south, where the water table lies under the soil surface and is variable seasonally. Based on the floristic composition it is classified into the following two subgroups.

a. *Drosera spathulata* subgroup, b. Typical subgroup

The first subgroup is characterized by the presence of *Drosera spathulata*, *Schoenus apogon* and *Scleria rugosa* var. *glabrescens*, and is limited to the coastal region. The second subgroup develops more widely at inland than the former.

(2) *Eriocaulon shikokianum* group

This group is characterized by the presence of *Utricularia racemosa*, *U. bifida*, *Eriocaulon shikokianum* and *Drosera rotundifolia*, and dominance of *Rhynchospora faberi*. The ground water table lies near the soil surface, and the community is fostered by oozing water. It is distributed from near the sea to the area at an elevation of 700 m, but is more frequently found in lowlands.

From its floristic composition the group is classified into the following two subgroups.

a. Typical subgroup b. *Juncus papillosus* subgroup

The first subgroup differs from the second in the presence of *Juncus papillosus*, *Habenaria radiata* and *Eleocharis wichuræ*, in the more variable ground water table and in the richer clay in soil.

3. *Rhynchospora fujiana* community

This community is characterized by the presence of *Rhynchospora fujiana*, and most widely distributed in this district, usually developing on sandy clay. It is most stable among the related communities.

Based on the floristic composition it is classified into the following two groups.

(1) *Dimeria ornithopoda* var. *tenera* group

This group is characterized by the presence of *Dimeria ornithopoda* var. *tenera* and *Ixeris dentata*. The coverage and height of the community are comparatively low.

From its floristic composition the group is subdivided into four subgroups.

- a. *Drosera spathulata* subgroup b. Typical subgroup
c. *Eriocaulon shikokianum* subgroup d. *Juncus papillosus* subgroup

The first subgroup is characterized by the presence of *Drosera spathulata*, *Schoenus apogon* and *Scleria rugosa* var. *glabrescens*. It develops on the rather steep slope facing south, and is fostered by oozing water. Its distribution is limited to the coastal region. The second one is distinguished by lacking the differential species. Its distribution area is wider than that of the first one. The third is different from the others by having *Utricularia racemosa*, *U. bifida* and *Eriocaulon shikokianum*, and by lacking *Habenaria radiata*, *Juncus papillosus* and *Eleocharis wichurae*. It usually develops on sandy soil. The last group is characterized by the presence of *Habenaria radiata*, *Juncus papillosus* and *Eleocharis wichurae*. It is found on sites more clayey than the preceding one.

(2) *Cirsium sieboldii* group

This group is characterized by the presence of *Cirsium sieboldii*, *Juncus effusus* var. *decipiens*, *Scirpus wichurae* and *S. fuirenoides*. It usually develops on stable sites of sandy clay. *Rhynchospora fujiana* and *R. chinensis* are dominant.

From the floristic composition it is classified into the following three subgroups.

- a. *Utricularia racemosa* subgroup b. *Juncus papillosus* subgroup
c. Typical subgroup

The differentiation of these three subgroups is due to the clay degree of concentration in soil and to the stability of sites. The first subgroup is a rather open community with a trend to be fostered by oozing water. In the typical subgroup, the coverage and height of the community are higher and the clay content of the soil is larger than in the others.

IV. Discussion

Studies of the moor vegetation have previously been carried out in the Chugoku district, by Horikawa et al. (1959), Hada & Suzuki (1974), and Hada (1972, 1973, 1975, 1976, 1977); in the neighboring Kinki district, by Nakanishi et al. (1970), Nakanishi (1977) and Yano et al. (1975). Compared with results of these studies, the moor vegetation of the southern lowland of Okayama Pref. is characterized by the presence of *Rhynchospora chinensis*, *R. brownii*, *R. rubra*, *Ischaemum aristatum* var. *glaucum*, *Hololeion krameri*, *Drosera spathulata*, *Schoenus apogon* and *Scleria rugosa* var. *glabrescens*, and lack of *Rhynchospora fauriei*, *Carex omiana*, *Lobelia sessilifolia*, *Hosta albomarginata*, *Scleria parvula*, *Astilbe microphylla*, *Lastrea thelypteris*, *Sphagnum palustre* and *S. microporum*. In this area, *Sphagnum palustre* is generally grown under shrub communities fringing the moor. The species characterizing the moor vegetation of this area are

mostly of the southern or the coastal element.

The communities characterized by *Rhynchospora chinensis*, *Ischaemum aristatum* var. *glaucum*, and *Hololeion krameri* have been reported by Honda (1977) from Nagoya City (70 m alt.), by Nakanishi (1977) from Hyogo Pref. (70–100 m alt.), and by Hada (1972, 1974) from Okayama Pref. (50 m alt.) and Hiroshima Pref. (200 m alt.).

The development of the moor vegetation is closely related to the geological condition, namely, the moor develops mainly in areas of granite, rhyolite or quartz-porphry. These rocks are siliceous and generally covered with *Pinus densiflora* forests. In the coastal region, *Pinus densiflora* communities developing on siliceous rocks, become open and are reduced in height, down to about 5 m, forming small tree forests. In such areas, small moors develop at the site where oozing water is observed.

Summary

This paper deals with the moor vegetation in the southern lowland of Okayama Pref., S. W. Japan. From phytosociological records collected during 1972 to 1978, the following three communities comprising four groups and eleven subgroups are distinguished.

1. *Rhynchospora brownii* community

2. *Rhynchospora faberi* community

(1) *Rhynchospora rubra* group (a. *Drosera spathulata* subgroup, b. Typical subgroup), (2) *Eriocaulon shikokianum* group (a. Typical subgroup, b. *Juncus papillosus* subgroup)

3. *Rhynchospora fujiana* community

(1) *Dimeria ornithopoda* var. *tenera* group (a. *Drosera spathulata* subgroup, b. Typical subgroup, c. *Eriocaulon shikokianum* subgroup, d. *Juncus papillosus* subgroup), (2) *Cirsium sieboldii* group (a. *Utricularia racemosa* subgroup, b. *Juncus papillosus* subgroup, c. Typical subgroup).

In this area, the moor vegetation is characterized by the presence of *Rhynchospora chinensis*, *R. brownii*, *R. rubra*, *Ischaemum aristatum* var. *glaucum*, *Hololeion krameri*, *Drosera spathulata*, *Schoenus apogon* and *Scleria rugosa* var. *glabrescens*, and lacking of *Rhynchospora fauriei*, *Carex omiana*, *Lobelia sessilifolia*, etc. The moor vegetation of this area bears a floral composition characteristic of low altitudes or southern regions. It develops only in the area consisting of granite, rhyolite or quartz-porphry.

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