

岐阜県産イネ科野草の生態: (1) 県内に生育する既知のイネ科野草

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Etsuyuki IWATA* & Masayuki MATUMURA** : Biological Flora of Grasses in Gifu Prefecture, Japan (1) Kinds of Wild Grasses Hitherto Known from the Prefecture

岩田悦行*・松村正幸** : 岐阜県産イネ科野草の生態
(1) 県内に生育する既知のイネ科野草

Introduction

Generally, grass means herbaceous plants belonging to the family of *GRAMINEAE* excluding woody plants like bamboos and Sasas. There are many kinds of grasses in Japan, and some of them are cultivated in the paddy or upland fields as the main crops in the country. On the other hand, some wild grasses are used for special purposes such as for producing fodders, medicines, dyes or thatches etc. The wild grasses perscribed by the authors in this study are native in a certain region of Gifu Prefecture, including some domesticated grasses escaped from the fields under human management and growing wild under natural conditions.

The effective utilization of these wild grasses are of very importance for agriculture in intermountain regions in the country. Before about twenty years or more, the late Dr. Isawo HIRAYOSHI, an emeritus professor of Gifu University, started biological studies on the wild grasses in Gifu Prefecture with the present authors. At the begining of a series of present studies, grasses belonging to the genera of *Miscanthus*, *Zoysia* and *Digitaria* etc. were selected as the materials of studies. But, recently the interest of the authors was focussed upon all the members of wild grasses found in Gifu Prefecture.

The study is now still continued as before with some co-workers. The real object of this series of studies is to elucidate the biological characters of each species of the wild grasses growing in the prefecture and to serve to utilize them in rational manners. The detailed results of the studies will be reported separately in forthcoming papers. In the present report, the authors presented a list of

the wild grasses in the prefecture. The list was prepared on the basis of recent reports on certain regions in the prefecture published by many other workers, and of the results of the authors' own observations.

The authors were much obliged to the late Dr. HIRAYOSHI to execute this study. His suggestions and kind helps encouraged much the authors' spirits of study. The authors sincerely give words of thank to him.

Kinds of wild grasses reported by Y. YOSHIDA

In 1941, Mr. Yutaka YOSHIDA reported the flora of Mino and Hida Provinces in his publication (YOSHIDA, 1941), issued as a commemorative publication of the 10th anniversary of the founding of Gifu College of Pharmacy. His report was related to higher plants wild in Gifu Prefecture at that time, and 61 genera and 117 species of wild grasses were described in the report. The report included 11 species of introduced grasses, some of which were formerly cultivated as fodder plants and later escaped from the fields to grow wild. Of these, domesticated grasses as fodder plants were as follows: *Agrostis palustris*, *Anthoxanthum odoratum*, *Dactylis glomerata* and *Phleum pratense*.

The following five species were doubtful whether they were cultivated or not, but were correctly introduced their seeds with those of domesticated grasses mentioned above. They were: *Avena fatua*, *Agropyron repens*, *Briza minor*, *Bromus inermis* and *Festuca myuros*.

The following two other species were native in Japan, and also introduced as fodder plants and cultivated extensively: *Poa pratensis* and *Poa trivialis*.

The wild grasses recorded by Y. YOSHIDA in the

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prefecture were arranged based on Dr. HONDA's system (HONDA, 1939). Thereafter some taxonomical examinations on the Japanese flora were undertaken; as the results, the scientific names of about 40 species of wild grasses in the prefecture which were reported by YOSHIDA were changed (HONDA, 1957; OHWI, 1975). For example, *Agrostis palustris* was changed to *A. alba*, and *Alopeculus geniculatus* to *A. aequalis* var. *amurensis* etc. And some species in YOSHIDA's report were disqualified from the situation of independent species. Besides, *Miscanthus oligostachyus* was very doubtful to distribute in Gifu Prefecture by the authors' judgement on phytogeographical standpoint (HIRAYOSHI et al., 1965), though it was recorded by YOSHIDA as a member of flora of the prefecture. It was excluded from the present list of wild grasses on this account.

Kinds of wild grasses newly appended

It has been a long period of over 30 years since YOSHIDA's publication (YOSHIDA, 1941). Many workers surveyed and published their theses (HASHIMOTO and SATOMI, 1973; MIZUNO, 1966; SHIMANO and MIZUNO, 1964; YONEZAWA et al., 1975) and reports (KITAMURA, 1968; MASAMUNE, 1961; MIYAWAKI et al., 1969; MIZUNO, 1978) on the regional flora of the prefecture during such a long time, and the authors also observed about wild grasses extensively extending over the prefecture during this period. According to these theses and reports, 25 kinds (13 genera and 25 species) of native grasses were added in the list of the wild grasses in Gifu Prefecture. They were as follows: *Achnatherum* (1 sp.), *Agrostis* (2 spp.), *Asperella* (2 spp.), *Calamagrostis* (3 spp.), *Cleistogenes* (1 sp.), *Festuca* (3 spp.), *Microstegium* (2 spp.), *Miscanthus* (1 sp.), *Muhlenbergia* (2 spp.), *Poa* (4 spp.), *Pseudoraphis* (1 sp.), *Setaria* (2 spp.), and *Trisetum* (1 sp.).

Of these, four genera (*Achnatherum*, *Asperella*, *Cleistogenes* and *Pseudoraphis*) and 20 species were new to the prefecture. There was another species, *Setaria xambigua*, which was reported by YONEZAWA et al., (1975) at Mannami in the northern part of Hida Province, but it was reserved to add to the present list for a time.

Through their intensive observations, the authors confirmed that the other kinds of grasses grew in the prefecture. These grasses contained five kinds of native and seven kinds of introduced

grasses. Those grasses belonging to the former group were: *Agropyron humidorum*, *Alopeculus aequalis* var. *aequalis*, *Coix lacryma-jobi*, *Leersia japonica* and *Miscanthus sacchariflorus*. Of these, *Agropyron humidorum* was also reported by SAKAMOTO (1975). *Coix lacryma-jobi* is not true native in Japan, and it is said that the grass was introduced from China in remote past.

The seven introduced grasses were: *Lolium multiflorum*, *Lolium perenne*, *Festuca arundinacea*, *Eragrostis curvula*, *Holcus lanatus*, *Arrhenatherum elatius* var. *bulbosum* and *Phalaris arundinacea* var. *picta*. The first three grass species were introduced and cultivated in the fields as fodder plants for past about 30 years, and now some of them escaped from the fields and grow wild everywhere in the prefecture. Of these, two species of *Lolium* were also reported by HASHIMOTO and SATOMI (1973) that they grew wild at Hirugano, northern part of Mino Province. The last two grasses, *Arrhenatherum elatius* var. *bulbosum* and *Phalaris arundinacea* var. *picta* were primarily introduced as ornamental plants and often planted in flower gardens. But some individuals of them escaped from the gardens and now grow wild abundantly at the road-sides near the gardens.

Recently, *Eragrostis curvula* (weeping lovegrass) was introduced for erosion control, and mainly used to protect the bare faced surfaces of newly formed slopes after construction works of highways or railways etc. It was often seeded with *Festuca arundinacea* (Kentucky 31-fescue) and other grasses and legumes. Some of the grasses of the two also escaped from the stands of slopes and now grow wild widely in southern part of the prefecture.

The other grass which was left behind to the last, *Holcus lanatus*, is regarded as one of the domesticated fodder grasses in Europe and America, but it is uncertain that the grass was cultivated practically in Japan. It is now found frequently in meadows and pasture lands in the prefecture, and is considered as one of the weeds there. Perhaps this grass was once introduced by the form of seeds mixed with those of other domesticated fodder grasses.

A list of wild grasses prepared by the authors

Based on the recent reports of many other workers and the authors' extensive field observations,

with reference to Y. YOSHIDA's description, a list of wild grasses in Gifu Prefecture was prepared by the authors (see Table 1). 156 kinds of wild grasses, which were classified into 72 genera and 142 species, were found in the prefecture. These genera and species were arranged in the list according to OHWI's system. OHWI described in his publication 95 genera and over 260 species of grasses found in Japan (OHWI, 1975). He excluded almost all of cultivated grasses in his enumeration. Two genera of *Lolium* and *Briza*, and *Eragrostis culvula* were not recorded, though *Holcus lanatus* was included in his enumeration.

The result of calculation excluding these unrecorded genera and species showed that the numbers of grass genera and species in the prefecture were about 74% and 53% of those known in Japan, respectively. As aforesaid, doubtful species were all excluded from the list, so that the authors expect that some species would be added newly in the near future through detailed surveys.

Summary

Generally speaking, the wild grasses are predominated by the grasses which are native in a certain region, but some introduced grasses, escaped from the fields under human management and growing wild under natural environment in the region, are also included in a category of wild grasses. Y. YOSHIDA (1941) reported 61 genera and 117 species of wild grasses known from Gifu Prefecture at that time.

Later, these grasses were examined taxonomically by some other workers. On the other hand, wild grasses which were not listed in previous papers in the prefecture, as the results, members of wild grass flora of the prefecture increased greatly. Based on recent reports on the flora of certain regions in the prefecture published by many other workers, and on the results of surveys by the authors for about twenty years or more, a list of wild grasses hitherto known from the prefecture was presented here (see Table 1). In this list 72 genera and 142 species were reported. Some species, which were thought by the authors that being doubtful to grow in the prefecture, were excluded from this list. Accordingly, the list is expected to renovate to a certain extent in the future.

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Table 1. List of wild grasses in Gifu Prefecture

1. *Achnatherum*
A. pekinense OHWI
2. *Agropyron*
A. ciliare FRANCH. var. *minus* OHWI
var. *pilosum* HONDA
A. humidorum OHWI et SAKAMOTO
A. respens P. BEAUV.
A. tsukushiense OHWI var. *transiens* OHWI
3. *Agrostis*
A. alba LINN.
A. clavata TRIN. var. *clavata*
var. *nukabo* OHWI
A. flaccida HACK.
A. mertensii TRIN.
A. nipponensis HONDA
A. scabra WILLD.
4. *Alopeculus*
A. aequalis SOBOL. var. *aequalis*
var. *amurensis* OHWI
A. japonicus STEUD.
5. *Andropogon*
A. brevifolius SWARTZ
6. *Anthoxanthum*
A. japonicum HACK.
A. odoratum LINN.
7. *Arrhenatherum*
A. elatius PRESL. var. *bulbosum* SPENNER
8. *Arthraxon*
A. hispidus MAKINO
9. *Arundinella*
A. hirta TANAKA
10. *Asperella*
A. japonica HACK.
A. longi-aristata OHWI.
11. *Avena*
A. fatua LINN.
12. *Beckmannia*
B. syzigachne FERNALD
13. *Brachypodium*
B. sylvaticum P. BEAUV.
14. *Briza*
B. minor LINN.
15. *Bromus*
B. catharticus VAHL.
B. inermis LEYSS.
B. japonicus THUNB.
B. pauciflorus HACK.
16. *Brylkinia*
B. caudata FR. SCHM.
17. *Calamagrostis*
C. arundinacea ROTH var. *brachytricha* HACK.
C. epigeios ROTH
C. fauriei HACK.
C. gigas TAKEDA
C. hakonensis FRANCH. et SAVAT.
C. langsdorfii TRIN.
C. longiseta HACK. var. *longiseta*
var. *longi-aristata* OHWI
C. matsumurae MAXIM.
C. pseudo-phragmites KOELER
- C. sachalinensis* FR. SCHM.
18. *Cinna*
C. latifolia GRISEB.
19. *Cleistogenes*
C. hackelii HONDA
20. *Coelachne*
C. japonica HACK.
21. *Coix*
C. lacryma-jobi LINN.
22. *Cymbopogon*
C. tortilis HITCHC. var. *goeringii* HAND.-MAZZ.
23. *Cynodon*
C. dactylon PERS.
24. *Dactylis*
D. glomerata LINN.
25. *Deschampsia*
D. caespitosa P. BEAUV. var. *festucaefolia* HONDA
D. flexuosa TRIN.
26. *Diarrhena*
D. japonica FRANCH. et SAVAT.
27. *Digitaria*
D. adscendens HENR.
D. timorensis BALANSA
D. violascens LINK
28. *Dimeria*
D. ornithopoda TRIN. var. *tenera* HACK.
29. *Eccoilopus*
E. cotulifer A. CAMUS
30. *Echinochloa*
E. crus-galli BEAUV. var. *crus-galli*
var. *oryzicola* OHWI
var. *praticola* OHWI
31. *Eleusine*
E. indica GAERTN.
32. *Eragrostis*
E. aquatica HONDA
E. curvula NEES
E. ferruginea BEAUV.
E. japonica TRIN.
E. multicaulis STEUD.
E. pilosa BEAUV.
33. *Eriochloa*
E. villosa KUNTH
34. *Eulalia*
E. speciosa O. KUNTZE
35. *Festuca*
F. arundinacea SCHREB.
F. myuros LINN.
F. ovina LINN. var. *ovina*
var. *tateyamaensis* OHWI
F. parvigluma STEUD. var. *parvigluma*
var. *breviaristata* OHWI
F. rubra LINN.
36. *Glyceria*
G. acutiflora TORREY
G. alnasteretum KOMAR.
G. ischyronaura STEUD.
G. leptolepis OHWI
37. *Hemathria*
H. sibirica OHWI
38. *Hierochloe*
H. odorata P. BEAUV. var. *pubescens* KRYLOV

39. *Holcus*
H. lanatus LINN.
40. *Imperata*
I. cylindrica BEAUV. var. *koenigii* DURAND
 et SCHINZ
41. *Isachne*
I. globosa O. KUNTZE
42. *Ischaemum*
I. anthephyroides MIQ. var. *eristachyum* HONDA
I. aristatum LINN.
43. *Koeleria*
K. cristata PERS.
44. *Leersia*
L. japonica MAKINO
L. sayanuka OHWI
45. *Leptochloa*
L. chinensis NEES
46. *Lolium*
L. multiflorus LAMARK
L. perenne LINN.
47. *Lophatherum*
L. gracile BRONGN.
48. *Melica*
M. nutans LINN.
M. onoei FRANCH. et SAVAT.
49. *Microstegium*
M. japonicum KOIDZ. var. *japonicum*
 var. *boreale* OHWI
M. nudum A. CAMUS
M. vimineum A. CAMUS var. *vimineum*
 var. *polystachyum* OHWI
50. *Milium*
M. effusum LINN.
51. *Miscanthus*
M. floridulus WARB.
M. sacchariflorus BENTHAM
M. sinensis ANDERS.
M. tinctorius HACK.
52. *Moliniopsis*
M. japonica HAYATA
53. *Muhlenbergia*
M. curviaristata OHWI
M. hakonensis MAKINO
M. japonica STEUD.
M. longistolen OHWI
M. ramosa MAKINO
54. *Oplismenus*
O. compositus BEAUV. var. *patens* OHWI
O. undulatifolius ROEMER et SCHULTES
 var. *undulatifolius*
 var. *japonicus* KOIDZ.
55. *Panicum*
P. bisulcatum THUNB.
56. *Paspalum*
P. thunbergii KUNTH
57. *Pennisetum*
P. alopecuroides SPRENG.
 f. *viridescens* OHWI
58. *Phaenosperma*
P. globosum MUNRO
59. *Phalaris*
P. arundinacea LINN. var. *arundinacea*
60. *Phleum*
P. alpinum LINN.
P. pratense LINN.
61. *Phragmites*
P. communis TRIN.
P. japonica STEUD.
62. *Poa*
P. acroleuca STEUD.
P. annua LINN.
P. fauriei HACK.
P. hakusanensis HACK.
P. nemoralis LINN.
P. nipponica KOIDZ.
P. pratensis LINN.
P. radula FRANCH. et SAVAT.
P. sphondylodes TRIN.
P. trivialis LINN.
63. *Polygogon*
P. fugax STEUD.
64. *Pseudoraphis*
P. ukishiba OHWI
65. *Sacciolepis*
S. indica CHASE var. *indica*
 var. *oryztorum* OHWI
66. *Setaria*
S. chondrache HONDA
S. fabri HERRM.
S. glauca BEAUV.
S. pallide-fusca STEPH. et C. E. HUBB.
S. viridis BEAUV.
67. *Spodiopogon*
S. depauperatus HACK.
S. sibiricus TRIN.
68. *Sporobolus*
S. fertilis W. CLAYTON
S. japonicus MAXIM.
69. *Themeda*
T. triandra FORSK. var. *japonica* MAKINO
70. *Trisetum*
T. bifidum OHWI
T. sibiricum RUPR.
71. *Zizania*
Z. latifolia TURCZ.
72. *Zoysia*
Z. japonica STEUD.

要約

筆者らはかねてからイネ科野草の効果的利用を企図し、幾つかの種について生態学的研究を進め、それらを利用するための基礎的知見を得るように努力してきた。ここにいうイネ科野草とはイネ科所属の草本植物で、地域に自生するもののほか、かつては特定の目的で導入されたがその後散逸して野生化し、または野生化しつつあるものも含まれる。

本研究は岐阜県産イネ科野草につき、種ごとにその生態的特性を明らかにし、それらに関する知見を総括することを目的とした。今回の報告は、筆者らの20年内外に及ぶ現地踏査の資料に基づき、また多く

の他の研究者によって発表された文献を考証して、現在、岐阜県内に生育するイネ科野草につき、大井の分類体系に準拠して種類目録を作製した(表1参照)。

岐阜県産高等植物のフロラに関しては吉田(1941)により一応の基礎ができたが、その後、多くの種が追加あるいは種の合併または分離が行われて、現在

のところ、本県産イネ科野草は72属 142種が挙げられる。しかしイネ科植物の分類には多くの異論があり、分類学的位置づけの未確定のものもある。また岐阜県内での生育が疑問視されている種も幾つかあり、これらの多くは今回の目録から除外された。したがって今後の研究によりこの目録はある程度の改変が行われ、あるいは新しい種の追加が予想される。

○ GRIME, J. P. 1979. *Plant Strategies & Vegetation Processes*. John Wiley & Sons, N. Y. (3,620-, paper)

著者のJ. P. GRIMEは英国シェフィールド大学植物生態学の教授で草地の群落生態その他に関する優れた研究を行っている生態学者である。この著作の根幹をなす理論は1974年に *Nature* (250: 26-31) 誌上に発表された“Vegetation classification by reference to strategies”と1977年に *American Naturalist* (111: 1169-1194) 誌上に発表された“Evidence for the existence of three primary strategies in plants and its relevance to ecological and evolutionary theory”と題する2つの論説の中で発表されたものである。“Strategy”, すなわち適応戦略に関する理論は、動物学者の David LACK の説に始まってその後 CODY (1966), MACARTHUR & WILSON (1967), PIANKA (1970) などによって発展させられたものであるが、こうした観点の植物への適用は J. L. HARPER (1967) の仕事に端を発したとよい。

GRIME の著作は、大きくは2つの部分から構成されている。第1部 *Plant Strategies* では、競合 (Competition)・環境圧 (Stress)・攪乱 (Disturbance) という3つの要因の定義に始って、これら3つの要因が植物の生育型、生理機能、物質生産並びに再生産システムの分化にかかわりをもっているかを論じている。その結果、植物の適応戦略の分化は基本的には競合型 (C: competitive), 環境圧耐性型 (S: stress-tolerant), 攪乱耐性型 (R: ruderal) の3型と、その組み合わせ型からなるとしている。

第2部では、先に論じた植物の C-, S- および R-strategist の3つの適応戦略型をもとにして、草本群落の成立に関与する要因と群落構造を特徴づける優占種と他の共存植物との関係、アレロパシーの問題、二次遷移と先駆植物群の特性などについても論じている。

要するに GRIME の学説の特徴は、一貫して植物群落の構造と機能を群落構成種の保有する生活史と適応戦略の特性から考察するという方法にあり、従来の形式社会的な観点から群落を認識するやり方とは、少くともこの点で大きな相違を示している(河野昭一)。

○ SOLBRIG, O. T. et al. (Ed.), 1979. *Topics in Plant Population Biology*. Columbia Univ. Press, Cambridge (6,300-)

この著作は表題のように「植物の個体群生物学」と呼ばれる新しい分野における最新の情報とその理論についてまとめたもので、O. T. SOLBRIG を始めとする4人の植物学者によって編集されたものであるが、米国における進化生物学の発展に多大な寄与をされた G. L. STEBBINS 博士の功績を記念するために出版されたものである。巻頭には STEBBINS 自身による植物進化学の50年と題する論説が掲載されている。植物個体群生物学の研究の進歩は、近年 J. L. HARPER を始めとする英国学派によってささえられてきた面が大きかったが、この著作の中では少くともアメリカ学派の考え方が全面的におし出され、G. L. STEBBINS を頂点とする過去50年間の米国内における研究をふまえて、新たな理論的な展開が試みられている。

全体の構成は4部からなっているが、第1部では「植物個体群の適応と遺伝的変異 (Adaptation and Genetic Variation in Populations)」が扱われ、まず、近年多用されているアイソザイムを用いた個体群の遺伝的構造の分析の有効性 (J. L. HAMRICK) と限界 (G. B. JOHNSON) とが論議され、次に個体群の遺伝子頻度に影響を及ぼす交配様式 (breeding system) と送粉機構 (pollination mechanisms) の役割 (O. T. SOLBRIG), また送粉動物の機能と隔離障壁の崩壊による種間雑種形成 (D. A. LEVIN) の問題とが論じられている。

第2部の「生活環を制御するパラメーター (Life-Cycle Parameters)」の章では、植物個体群を個体群動態、生存曲線と死亡要因の分析、種子の発芽習性と実生の定着様式の分化、個体再生産の特性などの観点から研究することの必要性が論じられ、具体的には *Viola* (R. E. COOK), *Solidago* (P. A. WERNER) などの例をあげて検討が加えられている。適応戦略 (Strategy) の理論についても再検討され (S. JAIN), その適用の限界と問題点が指摘されている。また、個体群の生態的にみた内的構造の分析と合せて、構成個体の遺伝的特性が調べられた例がセイヨウタンポポ (*Taraxacum officinale*) の場合で紹介されている (SOLBRIG, 1970, 1971; SOLBRIG & SIMPSON, 1974, 1977)。

第3部の「エネルギー生産と栄養の捕捉吸収 (Energy Harvest and Nutrient Capture)」の章では、植物の成長と個体群成立に関与する物質的、エネルギー的基礎について、光・水・炭酸ガス・栄養塩類などの資源の利用形態との関係から具体的に論じ、光合成システムの進化についても C₄-植物を含めて検討がなされている。この種の研究は古くは生理生態学 (eco-physiology) と呼ばれる領域に入るものであるが、個体群生物学との関連から植物の保有する生理機能の特性と進化がまとまった形で論じられたのは、これが始めてであるといつてよいであろう。その意味でも正しく current topics を扱った書物であるといつてよく、この分野の研究に興味をもつ研究者にとっては必読の書であろう(河野昭一)。