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O PROUČAVANJIMA SAMONIKLIH SRODNIKA RODA TRITICUM L. U LITORALNOJ ZONI JUGOSLAVIJE

Poljoprivreda i njena proizvodnja djelo su čovjeka stvarano vjekovima radi njegovog boljeg i bezbjednijeg života. One u osnovi čine dio opšteg životnog prostora kojega je čovjek organizovao u okviru prirodnog sistema: zemljište — voda — vazduh — živi svijet i predstavljaju najstariji oblik trajne organizovane ljudske djelatnosti.

Pšenica je ne samo najstarija nego i najrasprostranjenija i najznačajnija kulturna biljka, kojoj je ljudski rod posebno zahvalan za svoj razvoj i civilizaciju. Svojim neprekidnim lutanjem po prirodi i seljenjem od mjesta na mjesto, nosio je njeno sjeme sa sobom i sijao ga svuda dokle je dopirao, ukoliko su mu to dozvoljavale geografsko-ekološke prilike novih oblasti koje je naseljavao. Zbog toga se ona, prirodno, više proučava i poznaje bolje nego bilo koja druga biljka.

No i pored srazmjerno dobrog poznavanja ove značajne biljke, interesovanje za njeno porijeklo, nastanak, evoluciju, osobine i oplemenjavanje i dalje neprekidno raste, što se objašnjava prije svega potrebama njenoga daljega unapređenja i povećanja rodnosti.

Iako su postojeće sorte i odlike znatno rodnije i kvalitetnije od njihovih prvobitnih oblika, one ne zadovoljavaju sasvim potrebe savremenog čovjeka, jer im rodnost i kvalitet mogu biti još bolji, a otpornost prema polijeganju, niskim temperaturama, suši, biljnim bolestima, štetočinama i drugim čimlocima spoljne sredine — veća.

Mogućnosti sinteze i dobijanja novih boljih sorata ili poboljšanja postojećih gotovo su neograničene, s obzirom na to što genetska granica ni jedne biljke još nije dostignuta. Stoga bolje upoznavanje procesa obrazovanja današnjih oblika roda *Triticum* L. i posebno njihovog kulturno-istorijskog razvoja, ima osobito naučno i praktično značenje, prvenstveno radi iskorišćavanja njihovih pozitivnih nasljednih osnova, kao polaznog materijala za stvaranje novih i boljih kombinacija.

Savremeni modeli proizvodnje pšenice zahtijevaju, prije svega, stvaranje novih rodnijih i kvalitetnijih sorata, duže vegetacije. Pri tome se sve veća pažnja poklanja izboru roditeljskih parova i unošenju gena za odgovarajuća svojstva, prvenstveno za stvaranje sorata jačeg korijenovog sistema i boljeg snabdijevanja biljaka asimilativima, i sa čvrstim elastičnim stabljikama, visokim 70-90 cm, otpornih prema polijeganju, sa većom asimilacionom površinom, posebno vršnih listova erektofilnog položaja i optimalnog rasporeda u prostoru, sa najmanjom mogućom zasjenjenošću i dužom fotosintetskom aktivnošću i, naročito, sa krupnim, srednje zbijenim klasovima sa osjem i što većim brojem klasića i zrna u njima, visokog genetskog potencijala za rod.

Nove sorte sa takvim osobinama treba da su, uz to, i dovoljno adaptibilne prema prirodnim faktorima spoljne sredine — otporne prema suši, niskoj temperaturi i, osobito, prema napadu biljnih bolesti i štetočina, a ujedno i da povoljno reaguju na primjenu intenzivne agrotehnike u optimalnim uslovima gajenja.

Oplemenjivanje biljaka zasniva se u osnovi na unošenju novih pozitivnih svojstava, nastalih dugim evolucionim uticajem odgovarajućih gena u interakciji sa faktorima spoljne sredine. Da bi se nova sorta stvorila, često se genetske osnove za neka svojstva moraju tražiti u oblicima dalekih predaka i divljih srodnika roda *Triticum* L., koji, prema novijim proučavanjima (posebno Sears-a 1953, 1966; Evans-a i Jenkins-a 1960; Tsunewaki-a 1966) pružaju bogate izvore i znatne mogućnosti za stvaranje novih i boljih sorata. U kulturnim oblicima takvih izvora gotovo više nema.

Stoga se u novije vrijeme u tom pravcu i orijentiše znatna pažnja selekcionera pšenice (kao i drugog kulturnog bilja) i pored niza teškoća koje nastaju usljed međusobne inkompatibilnosti i drugih negativnih pojava, koje gotovo redovno prate interspecijesnu i intergenusnu hibridizaciju (Mc Fadden 1930, Mičurin 1929, Cicin 1963. i drugi).

Zbog toga razvijene zemlje sve više preduzimaju odgovarajuće razumne mjere da se sačuva obilje oblika genetske varijabilnosti i heterogenih prirodnih populacija kulturnog bilja i nji-

hovich divljih srodnika, koje i nadalje mogu biti veoma koristan materijal i osnova za hibridizaciju i stvaranje novih sorata.

U nas se, uza sve postignute uspjehe u toku poslijeratnog razvoja, za stvaranje novih sorata ne koriste dovoljno pozitivne osobine rijetkih vrsta niti, pak, domaćih odlika i populacija i njihovih divljih srodnika visoke genetske varijabilnosti i fotosintetske aktivnosti, kojima smo natprosječno bogati. To potvrđuju, pored ostalog, srazmjerno bogate domaće kolekcije diploidnih i tetraploidnih vrsta o kojima smo pisali na drugom mjestu (1975), kao i obilje izdiferenciranih oblika roda *Haynaldia* i *Aegilops*, koje je zapazila ekipa fitogenetičara u sastavu: Calvin Qualset i Patrich Mc Cyire, Univerzitet Davis, SAD; Milanko Stupar, Institut za biologiju — Novi Sad i Lubo Pavićević — Poljoprivredni institut — Titograd, 15. 16. i 17. juna 1984. u bazenu Skadarskog jezera i Crnogorskog primorja, kao i ekipa u sastavu Kimber Gordon — Missouri Columbia Univerzitet USA, Miodrag Dimitrijević, asistent za genetiku i oplemenjivanje bilja Poljoprivrednog fakulteta — Novi Sad i Lubo Pavićević, naučni saradnik Poljoprivrednog instituta — Titograd, koja je 11. i 12. juna 1986. posjetila istu oblast.

Ekipa iz 1984. posvetila je veću pažnju nalazu samoniklih oblika roda *Haynaldia*, a ona iz 1986. oblika roda *Aegilops*.

Nađeni oblici održali su se u ovoj oblasti tokom svoje evolucije, i prilagodili njenim nerijetko surovim prilikama, posebno siromašnim staništima, u kojima su stekli neka rijetka pozitivna svojstva, koja mogu poslužiti kao materijal i osnova za intergenusnu hibridizaciju sa oblicima srodnoga roda *Triticum* L. i dobijanja sorata prikladnih za ovu zonu gajenja.

Na nalaze ekipe u sastavu Kimber Gordon, Miodrag Dimitrijević i Lubo Pavićević osvrnuli smo se kratko u radu: O evoluciji i nekim mogućnostima daljeg unapređenja kulture pšenice (Poljoprivreda i šumarstvo, br. 2-3, 1986, Titograd). Posebno je naglašena korisnost nalaza rijetke vrste *Aegilops uniaristata* u ovoj oblasti, koja je, prema kazivanju Kimbera, do sada nađena na svega šest nalazišta u svijetu. Osobito podnosi posušna siromašna zemljišta sa većim sadržajem aluminijuma, pa se pretpostavlja da posjeduje gen ili grupe gena dovoljno otporne prema toksičnom dejstvu tog elementa.

Ekipa pak u sastavu Calvin Qualset, Patrich Mc Gyire, Milanko Stupar i Ljubo Pavićević objavila je rezultate svojih nalaza u radu: *Collection of Dasypyrum villosum (syn. Haynaldia villosa), Aegilops spp. and Hordeum bulbosum in Yugoslavia*. (University of California. Davis Agricultural Experiment Station. Cooperative Extension. Agronomy Progress Report. — 1984, No 157 pp 1-9).

Međutim, s obzirom da je ovaj rad i do danas ostao gotovo nedostupan širem krugu istraživača srpskohrvatskog jezičkog područja, autori smatraju da bi ga bilo korisno preštamovati u nekoj odgovarajućoj ediciji na našem jeziku i time omogućiti da se sa njim upoznaju pobliže i širi krugovi domaćih naučnoistraživačkih radnika koji se bave ili se budu bavili unapređenjem kulture pšenice.

Pored toga nadamo se da će se upoznavanjem sa ovim radom mlađe generacije podstaći na nova sistematska proučavanja domaće, ne samo kulturne nego i samonikle flore i vegetacije, kojima smo odista nadprosječno bogati na čitavoj teritoriji zemlje, a posebno u njenoj primorskoj oblasti. Ovo tim prije što imamo na umu s jedne strane osobiti značaj domaćih oblika, a s druge okolnosti da ih naš savremeni privredni razvoj i izmjena strukture biljne proizvodnje brzo potiskuju, što očigledno prijeti da u dogledno vrijeme dovede do njihovog gubitka za svagda iz sastava naše flore, s kojima bi, nažalost, nestale i sve korisne genetske osnove koje su sticale tokom dugotrajnog prilagođavanja surovim geografsko-ekološkim prilikama ove oblasti.

Želimo naglasiti posebno i na ovom mjestu da se odista previše nemarno odnosima prema prirodnom i kulturnom bogatstvu, kojemu se u naše vrijeme, usljed čestih nedovoljno promišljenih i neracionalnih intervencija u prirodi, remete harmonični odnosi i struktura, održavani skladno hiljadama godina, a znatan dio, posebno kulturnog oblika, i sasvim iščezava — i to baš u vrijeme kada se za oplemenjivanje pšenice i drugog kulturnog bilja, iz razvijenih zemalja, upućuju ka nama stručne ekipe oplemenjivača radi nalaza, proučavanja i korišćenja tog prirodnog i kulturnog blaga za ukrštanje i dobijanje novih sorata.

Collection of *Dasypyrum villosum* (syn. *Haynaldia villosa*),
Aegilops spp., and *Hordeum bulbosum* in Yugoslavia¹

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SUMMARY

Dasypyrum villosum (L.) Candargy (syn. *Haynaldia villosa*), several *Aegilops* species, and *Hordeum bulbosum* L. were collected from roadside populations at 33 sites along the Adriatic Coast of Croatia and Montenegro and in the interior of Montenegro 11-17 June 1984. The populations sampled were found mostly on disturbed sites from 0 to 1,000 m elevation. Populations at the higher elevations had not produced mature seed by 15 June and could not be sampled. Random samples were taken, generally of 3 to 5 spikes from each of 10 to 15 plants at each site. The seed was collected for evaluation of genetic variability in isozyme and seed protein loci and for important agronomic traits such as drought and disease resistance. Duplicate samples were taken at most sites with one set being retained at the Institute of Biology, Novi Sad and another set being processed at the Dept. of Agricultural Biology, University of Tuscia, Viterbo, Italy for distribution to University of California, Davis and to interested scientists.

Purpose of Collection

This expedition emphasized the collection of *D. villosum*. This species is an outcrossing, diploid, annual plant. It has the V genome which is not closely related to the A, B, and D genomes of common wheat (*Triticum aestivum* L.), but it can be hybridized with common wheat and also durum wheat (*T. turgidum* L.; A and B genomes). *D. villosum* has not been exploited

1 Preštampano iz: Agronomy Progress Report. University of California, Davis Agricultural Experiment Station, Cooperative Extension, No 157, November, 1984.

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as a gene donor to wheat. It is a vigorous plant on disturbed and moisture-stressed sites and therefore is a candidate for a source of genes for wheat improvement. *D. villosum* collections have been made in Italy but only to a limited extent in other countries in the Mediterranean basin. To our knowledge no collection had previously been made in Yugoslavia. The seen collection are to be used to study genetic variability within and among populations by growing progenies from the collected seeds in a common planting in the field and to assay allelic variations for isozymes and seed storage proteins. Potentially useful variants would thus be used in making hybrids with wheat. Geographical patterns and amount of genetic variability would be assayed to provide new data on the evolutionary biology of an annual allogamous plant.

Other species were collected when they were conveniently available. These included seeds or bulbs of *Hordeum bulbosum*, for use in crosses with wheat to produce haploids; and *Aegilops truncialis* L. and *A. ovata* L. for use in studies of the evolution of wheat.

Methods

The procedure for collection of *D. villosum* was to collect several spikes from each of at least 10 plants per site. Spikes from additional plants were collected if fertility was low or if plants had few tillers. In some cases a bulk collection was made by collecting single spikes from 75 or more plants per site. For the other species bulk collections were made of single spikes from at least 25 plants per site. Major features of the collection site were recorded, such as elevation, and soil texture. Some characteristics of the *D. villosum* plants could be recorded during collection, such as amount of tillering, height, spike length, glume color, awn color, waxiness, and spikelet pubescence. *Aegilops* plants were typically uniform.

Two independent samples were made at each site. One set of samples was sent to the Institute of Biology at Novn Sad and the second set was taken to Viterbo, Italy where C. De Pace at the University of Tuscia is processing the seeds for genetic studies to be done at Viterbo, Italy and Davis, California.

Five collection routes were followed: 1) along the coastal road from approximately 12 km west of SPLIT southeast to UL-

CINJ; 2) along the road from PETROVAC on the coast inland to TITOGRAĐ; 3) along the roads between TITOGRAĐ and NIKŠIĆ; 4) along road between TITOGRAĐ and CETINJE and on toward the NJEGOŠ Mausoleum; and 5) along the road between CETINJE and BUDVA on the coast. These routes are identified in Figure 1 along with the identification numbers for the sites where collections were made.

General Distribution of D. villosum

This species was often found along roadsides. It was common in recently disturbed sites such as road construction sites or rubbish dumps. *D. villosum* was often growing in association with annual forbs and grasses; it was seldom found in cultivated fields with wheat or barley. At the time of collection seed was not mature at the high elevation sites in Montenegro so no collections were made. A generous offer to make collections in the NIKŠIĆ area was made by representatives from a major state farm in that region. Those seeds were to be sent to Novi Sad for processing.

On Route 1, no *D. villosum* was seen from south of BAR to near ULCINJ in an area characterized by a different type of vegetation than that northwest along the coast. There were more shrubs and climate appeared drier. On Route 2, there was no *D. villosum* from site 12 to top of pass and on past SKADARSKO JEZERO to site 23. On Route 3, higher elevations, 600 to 700 m, had *D. villosum* but it was at anthesis, e. g., at KRUPAČKO JEZERO. On Route 4, also at elevations 600 m to 1,000 m, plants of *D. villosum* were late, many were pre-anthesis.

Log of Sites Where Collections were Made (Figure 1) *Route 1, Coast from SPLIT to ULCINJ*

Site 1. GRADAC, 1.0 km south of village. 25 m elevation; roadside population. Polymorphic for spike color (purple); one plant dense spike; soil thin and rocky. About 30 plants

- total in the population, collected 3 spikes each from 10 plants.
- Site 2. SPLIT area, on main highway to north (to RIYEKA), turned right toward LECEVIĆA (1.0 km), 100 m elevation. Site collected at railroad track near a small church. Rather deep soil, vigorous plants, *H. bulbosum* abundant, spikes collected, probably sterile. 16 spikes collected, all from different plants.
- Site 3. SPLIT area. Continued on road to LECEVICA 1.6 km from Site 2. 200 m elevation. One head/plant sampled, plants were small and close together. No further *D. villosum* was found along this road up to 500-700 m elevation.
- Site 4. OPUZEN, 8 km south of SPLIT-DUBROVNIK junction. Sea level. Neretva river delta area. Large population at roadside near petrol station. Single heads sampled from 77 plants. Good soil.
- Site 5. KOMOLAC, at east end of bay; sea level; abandoned field, silty clay; also collected bulk *H. bulbosum*.
- Site 6. 1 km southeast of MLINI; coastside of road on steep hillside to the sea, silty clay; 400 m elevation; also collected *Ae. triuncialis*.
- Site 7. 300 m southeast of GRUDA; 100 m elevation; north roadside, loam; especially tall plants with long heads.
- Site 8. 1 km southeast of RISAN; sea level; south roadside, sand-silt; plants with few tillers, took spikes from 15 plants.
- Site 9. 2 km northwest of BUDVA; 30 m elevation; both sides of road, sand-silt; no *D. villosum*, only bulks of *Ae. ovata* and *Ae. trincialis*.
- Site 10. MILOCER; sea level; north roadside dump, sand-silt, gravel; also collected *Ae. ovata*.
- Site 11. 2 km northwest of junction with road to TITOGRAD, near PETROVAC; south roadside, sand-silt, dump area along road to AS Hotel.
- Site 30. BULJARICA; 5 m elevation; north roadside, fill area, sand-site, gravel; quite variable in color.

- Site 31. 250 m southeast of MISICI; 50 m elevation; both sides of road; cut bank on north, fill on south, sand-silt; plants later on south side.
- Site 32. 2 km southeast of SUTOMORE; 10 m elevation; south roadside, dump and fill, sand-gravel.
- Site 33. At turnoff to ULCINJ center; 10 m elevation; south roadside, fill, sand-silt; *D. villosum* variable with respect to maturity; also collected *Ae. ovata*.

Route 2, Coast to TITOGRAD

- Site 12. 5 km from PETROVAC turnoff; 1300 m elevation; roadside, silt-gravel; good stand, difficult to distinguish single plants; took spikes of eight single plants then bulked single spikes of approximately 50 plants; also collected *Ae. ovata* and *Ae. triuncialis*; *H. bulbosum* present but sterile.
- Site 23. CEMOVSKO POLJE, 3 km from TITOGRAD on road to PETROVAC; 50 m elevation; large abandoned field, shallow reddish, sand-silt soil; collected 10 single plants then collected 75 single heads from plants at one-meter intervals on each of two passes across field; also collected *Ae. ovata*.

Route 3, TITOGRAD-NIKSIĆ

- Site 13. LJESKO POLJE, west of TITOGRAD; 50 m elevation; mixed soil from fills; thick stand, difficult to distinguish single plants, took single heads from approximately 25 plants; powdery mildew on many plants, some glaucous.
- Site 14. SPUZ; 50 m elevation; berm on west roadside; organic soil; late plants; at least one infected with a rust.
- Site 15. SLAP; 50 m elevation; north roadside, loam; sparse stand, most plants at anthesis; collected six plants with possible seed; polymorphic for glaucousness.
- Site 16. 4 km northwest of SLAP; 50 m elevation; both sides of road, loam; plants with both powdery mildew and rust; also collected *Ae. ovata*.
- Site 17. KAPINO POLJE near NIKSIĆ; 600 m elevation; along field, loam; late plants, perhaps no seed.
- Site 18. MRKOSTICA near NIKSIĆ; 600 m elevation; roadside loam; late plants, took spikes from 20 plants and a bulk of single heads from 25 plants.
- Site 19. DRENOVSTICA; 350 m elevation; west roadside on sandy, rocky fill from road construction; good seed set but late-

-maturing plants; took spikes from 11 plants and a bulk of single heads from 50 plants.

- Site 20. GLAVICA; 60 m elevation; west roadside on sandy, rocky fill; a population monomorphic for purple glumes and culms small spike length, several still at anthesis.
- Site 21. STOLOGlav; 50 m elevation; west roadside on sandy, rocky fill, soil in fields was red (bauxite?); no *D. villosum*; collected *Ae. ovata*.
- Site 22. LESKO POLJE; 60 m elevation; south roadside, silt-gravel, 1 km from TITOGRAĐ; variable maturity, few tillers.

Route 4, TITOGRAĐ-CETINJE

- Site 24. FARMACI; 40 m elevation; 3 km from TITOGRAĐ; field north of road, sandy loam; sparse plants, variable in color; collected *Ae. ovata*.
- Site 25. METERIZI, 4 km before turnoff to RIJEKA CRNOJEVICA; 200 m elevation; both roadsides, 100 m along road, sand-gravel; sparse plants; collected *Ae. ovata*, many tillered plants.
- Site 26. 3 km from CETINJE on road to NJEGOS Mausoleum; 750 m elevation; sand-gravel fill at roadside; tiny plants, less than 50 cm, with only one or two tillers, just past anthesis.
- Site 27. BJELOSI, 6 km from CETINJE on road to NJEGOS mausoleum; 900 m elevation; loam in a terraced abandoned garden; plants at anthesis, took only five, small heads, variable color.

Route 5, CETINJE-BUDVA

- Site 28. 500 m from CETINJE; 600 m elevation; sand-gravel cut and fill on both sides of road for 20 m; plants sparse, variable in color.
- Site 29. 2 km from coast road to BUDVA; 150 m elevation; both sides of road, sand-gravel fill on one and bedrock on other; plants variable for color and waxiness.

Note on the taxonomic status of *Dasypyrum villosum*

We follow the nomenclature for *Dasypyrum villosum* according to the interpretation of Humphries (1978):⁵

⁵ Copied from *Flora Europea Notulae Systematicae* No. 20, *Botanical Journal of the Linnean Society* 76: 294-384, 1978.

(285) *Dasypyrum* (Cosson & Dur.) T. Durand.

Schur, in his *Enumeratio Plantarum Transsilvaniae* (1866), was the first to recognize that *Secale villosum* L. was distinct from other species of *Secale* L., and indeed all other genera in Gramineae tribe Triticeae on the basis of the singly arranged spikelets and the long-awned, ciliate glumes and lemmas. He placed it in a new genus, *Haynaldia* Schur, but unfortunately this name had been used in the same year to describe a fungal pathogen of tomatoes, *Haynaldia umbrina*, by Schulzer von Muggenburg in Muggenburg, Kanitz and Knapp's, *Die bisher bekannten Pflanzen Slavoniens*: 37, 1 (1866). Bibliographical evidence suggests that Schulzer's use of the name takes priority as the first valid publication and that a different name for *Haynaldia villosum* must be sought. The publication of *Haynaldia umbrina* was first announced in *Botanische Keinig Keisen in Bushhandel, Flora*, 49: 224 (30 May 1866) and a second review occurs in the *Revue bibliographique* 3, in *Bull. Soc. Bot. Fr.*: 111 (May-June 1866). Therefore, valid publication obviously occurred in May 1866 at the latest. Evidence from Borbás in *term. Tud. Közl.*, 28: 331 (1896) that Schulzer's use of the name was first announced at the Viennese Botanical and Zoological Conference in 1865 cannot be accepted as being validly published.

The earliest review of Schur's *Enum. Pl. Transilv.* (1866) occurs in *Oesterreichische Botanische Zeitschrift, Wien*, 16: 230 (July 1866). Other reviews can be found in the *Revue bibliographique* of the *Bull. Soc. Bot. Fr.*: 278 (Nov-Dec. 1866) and in *Bot. Zeit.*, 24: 330 (19 Oct. 1866). The earliest publication is, therefore, either June or July 1866, and indeed, this is likely as the preface is dated April 1866.

Marschall von Bieberstein in *Fl. Taur.-Cauc.*, 1: 85 (1808) transferred *Secale villosum* L. to the genus *Triticum* on the basis of the single spikelet character and it has since been considered as a distinct section of that genus: *Triticum* sect. *Dasypyrum* Cosson & Durieu in *Expl. Alg. Phan.*: 202 (1855) and *Triticum* sect. *Pseudosecale* Godr. in *Gren. & Godron, Fl. Fr.*, 3: 599 (1856).

Tzvelev, in *Nov. Syst. Pl. Vasc.*, 10: 45 (1973), wishing to keep the European annual a distinct genus, used the name *Dasypyrum* (Cosson & Durieu) Borbás. The reference he cites for Borbás in *Term. Tud. Közl.*, 28: 331 (1896) makes no mention of *Dasypyrum* as a generic name and it is not, in fact, validly published at all. Borbás in *Term. Tud. Közl.*, 29: 378 (1898) does use the name *Dasypyrum villosum* var. *glabratum* to describe glabrous variants from the environs of Budapest, but this is a nomen nudum. Current Russian authors acknowledge Tzvelev's validation of Borbás's name but T. Durant was the first author to validate *Dasypyrum* as a distinct genus and in *Index Gen. Phanerog.*: 504 (1888) he makes the relevant combinations for the widespread annual *D. villosum*,



the North African and Greek perennial *D. hordeaceum* and a third, eastern Mediterranean species *D. sinaicum*. In conclusion, I have outlined below the names and synonymy of taxa recognized in Europe.

Dasypyrum (Cosson & Durieu) T. Durand, *Index Gen. Phanerog.*: 504 (1888).

Syn. *Triticum* Sect. *Dasypyrum* Cosson & Durieu, *Expl. Alg. Phan.*: 202 (1855).

Triticum Sect. *Pseudosecale* Godr. in Gren. & Godron, *Fl. Fr.*, 3: 599 (1856).

Haynaldia Schur, *Enum. Pl. Transsil.*: 807 (1866); Hackel in Engler & Prantl, *Natürl. Pflanzenfam.*, 2(2): 79 (1887); Hylander, *Nordisk Kärnväxtflora*, 1: 363 (1953) *nomen conserv. props.*; non *Haynaldia* Schulz-Mugg, nec *Haynaldia* Kanitz, nec *Haynaldia* Pantocsek.

(1) *D. villosum* (L.) P. Candargy, *Archiv Biol. Veg. Athènes.*, Fasc. 1: 35, in clavi 62.

Syn.: *Secale villosum* L., *Sp. Pl.*: 84 (1753).

Hordeum ciliatum Lam., *Encycl. Méth. Bot.*, 4: 604 (1753).

Triticum caudatum Pers., *Syn. Pl.*, 1: 110 (1805).

Triticum villosum (L.) Bieb., *Fl. Taur.-Cauc.*, 1: 85 (1808); Gren. & Godron, *Fl. Fr.*, 3: 599 (1856); Cosson & Durieu, *Expl. Alg. Phan.*: 202 (1855).

Agropyrum villosum Link, *Hort. Berol.*, 1: 31 (1821).

Haynaldia villosum Schur, *Enum. Pl. Transsilv.*: 807 (1866).

Dasypyrum villosum var. *glabratum* Borb., *Term.-Tud. Közl.*, 29: 378 (1898), *nomen nudum*.

Pseudosecale villosum (L.) Degen, *Fl. Veleb.*, 1: 574 (1936).

(2) *D. hordeaceum* (Cosson & Durieu) P. Candargy, *Archiv Biol. Veg. Athènes.*, Fasc. 1: 35 (1901).

Syn. *Triticum hordeaceum* Cosson & Durieu, *Alg. Phan.*: 202 (1855).

Haynaldia hordeacea (Cosson & Durieu) Hackel in Engler & Prantl, *Natürl. Pflanzenfam.*, 2(2): 80 (1887).

ACKNOWLEDGEMENTS

This collection expedition was conducted and supported by the Institute of Biology and the Faculty of Agriculture, University of Novi Sad, the Commission for Education Exchange between Yugoslavia and U.S.A., and the University of California, Davis. It is part of a larger study of the genetic structure of natural popu-

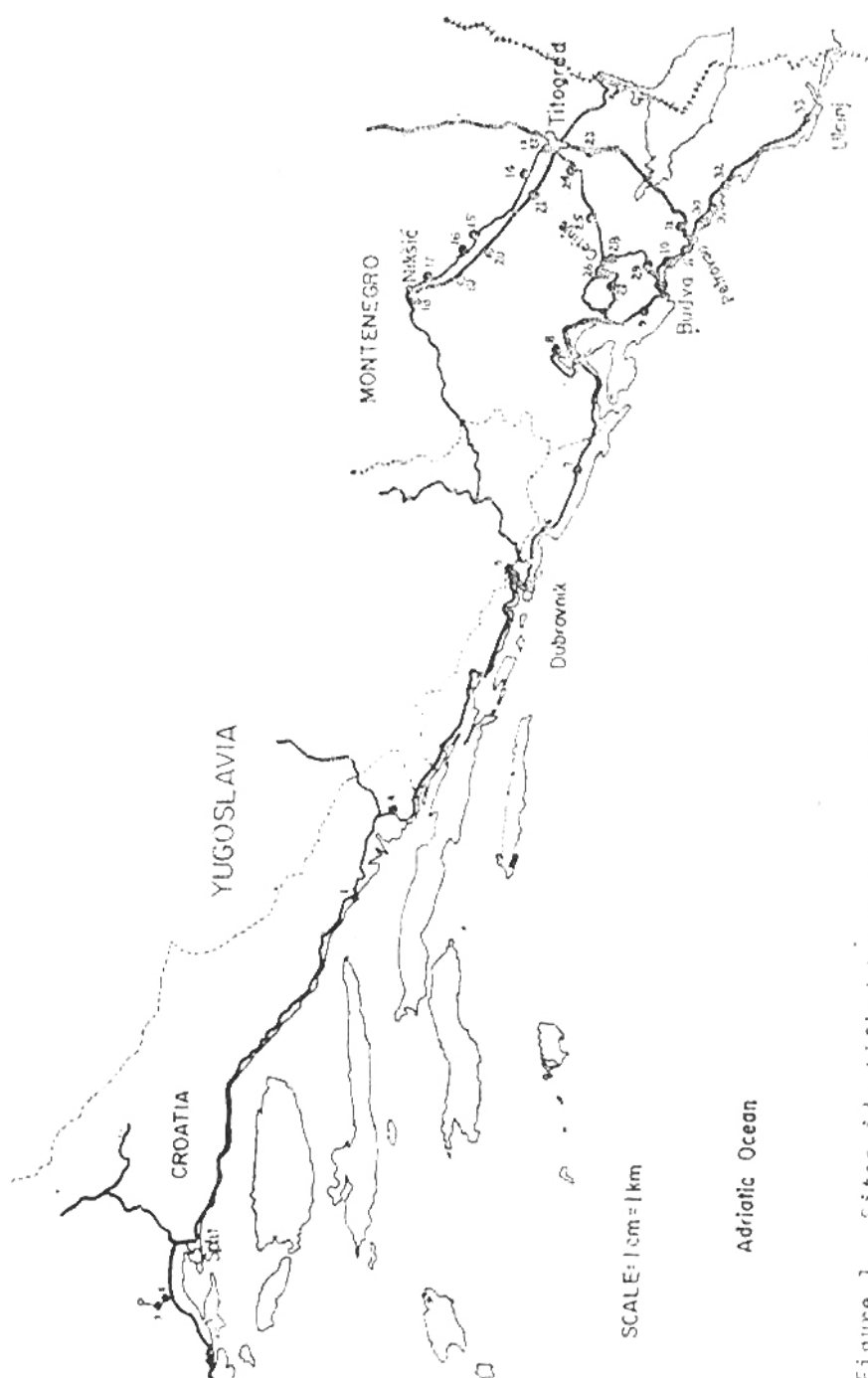


Figure 1. Sites identified by number for the collection of *D. villosus*, species of *Aegilops*, and *H. bulbosus* in Yugoslavia.

lations of *Dasypyrum villosum* which include populations collected in Italy under support of the U.S. National Science Foundation and the National Research Council of Italy.

We especially appreciate the support of Professors Katarina and Slavko Borojevic for their assistance in facilitating this plant germplasm collection activity.

LITERATURA

1. Borojević, Sl. et al.: Dostignuti nivo i dalji pravci razvoja i primjene nauke u poljoprivredi. Savremena poljoprivreda, br. 3-4, Novi Sad 1980.
2. Borojević, Sl.: Genetički princip izgradnje modela visokoprinosnih sorti pšenice. Genetika, Vol. 4, No 1, Beograd, 1972.
3. Borojević, Sl.: Genetičke i tehnološke promjene koje su izazvale preokret u oplemenjivanju bilja, Novi Sad, 1988.
4. Borojević, Sl.: Principi i metodi oplemenjivanja bilja, Novi Sad, 1981.
5. Dorofeev V.: Pšenici mira. Kolos, Leningrad, 1976.
6. Plakserger K.: Pšenica, Moskva-Leningrad, 1935.
7. Grinjak, P.: Contribution a l'etude de Triticum durum Desf. INRA, Paris, 1965.
8. Sarić, M.: Fiziološke i morfološke osobine ideotipa pšenice, Fiziologija pšenice, Posebno izdanje OPN CANU, knj. 53, Beograd, 1981.
9. Kihara H. and Tanaka M.: Morfological and physiological variation among *Aegilops squarrosa* strains collected in Pakistan, Afghanistan and Iran, Preslia, 1958.
10. Mac Key: Genetičeskie osnovi sistematiki pšenice. Seljskoh, biologija br. 1. Moskva (prevod sa engleskog) 1968.
11. Pavićević, Lj.: Diploidne i tetraploidne pšenice u Crnoj Gori i susjednim oblastima. Prirodoslovna istraživanja, knj. 40, Acta biologica VII, 3-8, JAZU, Zagreb 1975.
12. Pavićević, Lj.: Triticum spelta L. Poljoprivreda i šumarstvo br. 4, Titograd, 1985.