



Research Article

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Cultivation of Crops and Wild Relatives in the Genus *Avena* L. (Poaceae) in the Georgia (South Caucasus)



Maia Akhalkatsi^{1*}, Annette Otte², Tamar Goloshvili¹, Tamar Girgvliani¹ and Lamar Mazanishvili¹

¹Department of Plant Genetic Resources, Institute of Botany, Ilia State University, Georgia

²Division of Landscape Ecology and Landscape Planning, Institute of Landscape Ecology and Resources Management, Justus-Liebig University, Germany

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***Corresponding author:** Maia Akhalkatsi, Head of Department of Plant Genetic Resources, Institute of Botany, Ilia State University, Faculty of Natural Sciences and Engineering, K Cholokashvili 3/5, 0162 Tbilisi, Republic of Georgia; Tel: +995 599193529; Email: maia_akhalkatsi@iliauni.edu.ge

Abstract

Avena L. crops are cultivated in agriculture as 3 species in Georgia: *A. sativa*, *A. sativa* var. *aurea* and *A. sativa* var. *krausei*. The uses of the crop wild relatives (CWR) are total related to species of direct socio-economic importance, which includes the progenitors of crops. Accepted name of *Avena* are 6 species in Georgia and these have many synonyms as 25 species. CWRs are to 4 species: *A. fatua*, *A. sterilis* subsp. *ludoviciana*, *A. sterilis* and *A. barbara*, and these are with GP-1B and TG-1B. Other *Avena* are of 2 species: *A. clauda* and *A. ventricosa* in Georgia and these are not for cultivated crops and they have GP-3 and TG-3. *A. fatua* and *A. sterilis* subsp. *ludoviciana* are for cultivated of crops as *A. sativa*. These are with chromosomes of genes $2n=42/48$. *A. barbara* is making as cultivated of crops as *A. sativa* var. *aurea*, which is in Svaneti, Meskhети and Tusheti. A normal chromosome is in of genes $2n=14/28/32/42$. *A. sterilis* has storage of varieties for *A. sativa* var. *krausei* and it has genes $2n=28/42$. Two species: *A. clauda* and *A. ventricosa* has small genes $2n=14$. All species has height, length, leaf and flowers of the ground.

Keywords: *Avena* cultivated crops; CWRs; Chromosomes of genes; Accepted; Synonyms

Introduction

The genus *Avena* L. (Poaceae) includes cultivated species with different ploidy levels and a number of wild species reflecting a wide range of botanical and ecological diversity. With this in view, oat species became the subject of investigations to specify the complex organization of the *Avena* genus and indicate aspects of its evolution and phylogenetic links between the species. Oats – *Avena sativa* L. was cultivated in Georgian regions and mainly used as forage [1]. These crops are a traditionally cultivated plant distributed from 400 to 1400m a.s.l., and present, it is cultivated only in high mountain regions from 1000-1800m a.s.l. It is used only as forage for horses and poultry. This mountain area is used as forage plant. The origin of seed material is unknown.

The local population is purchasing the seeds in the market and receives no information or instructions on its origin. Several varieties are described in Upper and Lower Svaneti: *A. sativa*. It is used only as forage for horses and poultry. Two varieties of oats have been described for Upper Svaneti, Meskhети and Tusheti: *A. sativa* var. *aurea* Körn. and *A. sativa* var. *krausei* Körn. [2,3]. *A. sativa* var. *aurea* is as in Germany and America. It is purchased in the market and farmers receive no information about their origin. Oat is one of the most important cereal crops in the world. A majority of these forms came from the centers of origin, which by

definition shows great diversity of *Avena* species. Further search for agronomical traits and utilization of new oat breeding sources is very important for breeding purposes.

The crop wild relatives (CWRs) of *Avena* are related taxa to species of direct socio-economic importance, which includes the progenitors of crops. CWRs are restricted only to species related to cultivated crops, including such important field crops as oats – *A. sativa* and industrial crops. Wild oats are perpetual invaders of cereal fields in Caucasus and elsewhere. Wild species found in the Georgia are *A. fatua*, *A. ludoviciana*, *A. barbata*, which are considered participated in speciation process [4].

Georgia CWR of *Avena* is often encountered as weeds in ruderal areas and therefore, ex situ conservation of seed may prove the more effective conservation methodology. CWR of 8 species are considered as synonyms or subspecies of crops by some authors. *Avena* of 8 species are the same as medicinal crops: vitamins B1, B2, B3, B6, E. We have very little information on this species, but it should be possible to grow it as a spring sown annual in Georgia and might also succeed as an autumn-sown crop.

A. fatua species, one report says that it is possibly a subspecies of *A. ludoviciana* and is often cultivated for its edible seed in

warmer temperate zones [5,6], whilst some modern works see it as no more than a synonym of *A. sativa*. Rural vegetation is one of the most interesting in terms of CWR. Especially, field crop wild relatives occur in this biome. Although this point has often been made in the context of CWR conservation [7-9], it should not entirely negate the implementation of *in situ* conservation activities both inside and outside of formal protected areas as discussed above.

We have several species of *Avena* in Georgia and many are as synonyms and we have some accepted name. The importance of this project is determined by ability of CWR to exchange genes with the crops. CWR germplasm is used to improve production and food quality of cultivars originated previously due to domestication of crop ancestor species. CWRs have already made substantial contributions to improving food production through the useful genes that they contribute to new crop varieties. They have provided resistance to pests and diseases in a wide range of crops. The genes that come from CWR and other wild plants make a direct contribution to increased human wellbeing through improving agricultural production and maintaining sustainable Agro-Ecosystems. Therefore, the effective conservation and sustainable use of CWRs are essential elements for increasing food security, eliminating poverty and maintaining a healthy environment.

Materials and Methods

Plant material

Crop wild relatives (CWRs) are wild plant species closely related to crops, including wild ancestors. There are an accepted name of 3 crops and 6 CWRs of *Avena* as naturalized species and in Georgia. *Avena* are crops:

- a. *A. sativa* L.
- b. *A. sativa* var. *aurea* Körn
- c. *A. sativa* var. *krausei* Körn

CWRs are of *Avena*:

- a. *A. barbata* Pott. ex Link
- b. *A. clauda* Durieu
- c. *A. fatua* L.
- d. *A. sterilis* L.
- e. *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne
- f. *A. ventricosa* Balansa.

Flora Georgian has other 7 and 8 species of *Avena* from Makashvili A, Sosnovski L [10] and Ketskhoveri N [2]. Many of species are as synonyms and some are as accepted name:

- a. *A. pilosa* M. Bieb. is a synonym of *A. clauda* Durieu
- b. *A. barbata* Pott. is an accepted name
- c. *A. sativa* L. is an accepted name

- d. *A. fatua* L. is an accepted name
- e. *A. meridionalis* (Malzev) Roshev. is a synonym of *A. fatua* L.
- f. *A. trichophylla* K. Koch is a synonym of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne
- g. *A. sterilis* L. is an accepted name
- h. *A. ludoviciana* Durieu is a synonym of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne.

Avena crops of 2 species are from Ketskhoveri N [2]:

- a. *A. sativa* var. *aurea* Körn.
- b. *A. sativa* var. *krausei* Körn.

Flora of Caucasus is from Grossheim AA [8] and has many species of the *Avena* in Georgia. These species are in Caucasus and if it is not in Georgia and this is as synonym and other accepted name of *Avena* species are from this place:

- a. *A. clauda* Durieu is an accepted name
- b. *A. pilosa* M. Bieb. is a synonym of *A. clauda* Durieu
- c. *A. bruhnsiana* Gruner is a synonym of *A. ventricosa* Balansa
- d. *A. barbata* Pott. is an accepted name
- e. *A. wiestii* Steud. is a synonym of *A. barbata* Pott. ex Link.
- f. *A. meridionalis* (Malzev) Roshev. is a synonym of *A. fatua* L.
- g. *A. macrantha* (Hack.) Malzev is a synonym of *A. sativa* L.
- h. *A. fatua* L. is an accepted name
- i. *A. sativa* L. is an accepted name
- j. *A. ludoviciana* Durieu is a synonym of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne
- k. *A. trichophylla* K. Köch is a synonym of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne
- l. *A. sterilis* L. is an accepted name.

Agrarian crops and wild fruit resources was determined as the accepted Latin names and these species has different names for as synonyms and subspecies. Linking phenotypes is very much to the usefulness of good molecular characterization, together forming the basis of progress in modern genomics research in crop plants. It will be to determine which varieties and species of crops and fruits are cultivated in alpine zone as the upper limit till the location of 1800m a.s.l. In the classification, wild species were used both as two groups and in other calculation as separate cultivars.

Methodology

Genus *Avena* involves natural CWR species diversity. According to this concept three Gene Pools (GP) are distinguished as follows:

Primary Gene Pool (GP-1) within which GP-1A are the cultivated forms and GP-1B are the wild and weedy forms of the crop. Secondary of Gene Pool (GP-2) which includes the coenospecies (less closely related species) from which gene transfer to the crop is possible but difficult using conventional breeding techniques. Tertiary Gene Pool (GP-3) which includes the species from which gene transfer to the crop is impossible, or if possible requires sophisticated techniques, such as embryo rescue, somatic fusion or genetic engineering.

The taxon group concept is used to establish the degree of CWR relatedness of a taxon. Application of the taxon group concept assumes that taxonomic distance is positively related to genetic distance. CWR rank of taxon groups according is defined as follows:

- a. Taxon Group 1A (TG-1A) is a crop.
- b. Taxon Group 1B (TG-1B) is same species as crop.
- c. Taxon Group 2 (TG-2) is same series or section as crop.
- d. Taxon Group 3 (TG-3) has same subgenus as crop.

- e. Taxon Group 4 (TG-4) has only same genus.
- f. Taxon Group 5 (TG-5) is same tribe but different genus to crop.

Statistical analyses

Agrarian crops and wild fruit resources was determined as the accepted Latin names and these species has different names for as synonyms and subspecies. Molecular characterization is very much linked to the usefulness of good, together forming the basis of progress in modern genomics research in crop plants. It will be to determine which varieties and species of crops and fruits are cultivated in Mounties as coordinates and the upper limit till the location 1900m a.s.l. STATISTICA 6.0 software was used for cluster analysis. this method uses an analysis of variance approach to evaluate the distances between clusters. This attempts to minimize the Sum of Squares of any two (hypothetical) clusters that can be formed at each step. The distance measure interval is Euclidean distance, computing distances between objects in a multidimensional space. These three analyses were performed using the software package SPSS Statistics 16.0, PC-ORD 5.33 and Statistica 6.0, respectively.

Results

Avena species cultivated crops

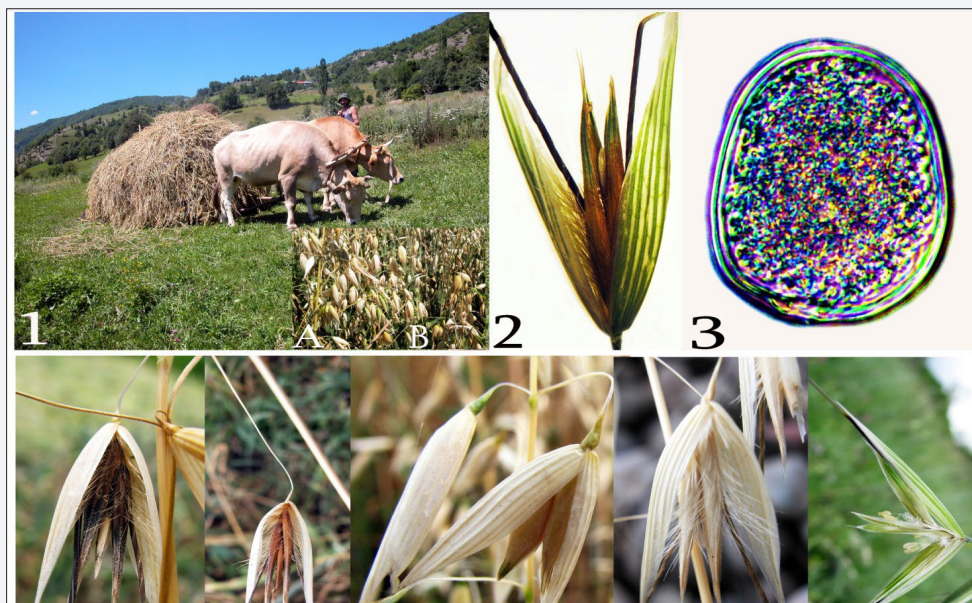


Figure 1:

1. Georgian crops of Avena are in Upper Svaneti v. Shkaleri (1330m) and there are other crop species:
 - a. *A. sativa* var. *aurea*
 - b. *A. sativa* var. *krausei*; These are made for medicinal in this historical province of Svaneti.
2. *A. sativa* is crops and it has a 2-3-flowers.
3. Pollen of *A. sativa* has length of the horizontal height as 43-54µm.
4. *A. fatua* has spikelets of medium size with 2-3-flowers.
5. *A. sterilis* has few flowers, with almost undivided branches and has 3-5-flowers.
6. *A. sterilis* subsp. *ludoviciana* has spikelets 2-3-flowers, the lower ones 2-flowers all awned.
7. *A. barbata* has a panicle with branches bearing numerous 2-flowers spikelets.
8. *A. clauda* has 2-3-flowers all awned.

Table 1: Avena species are in different heights in Georgia: location with coordinates with degrees and minutes, elevation with above sea level in meters (N=9).

S.N	Avena species	Location	Coordinates	Elevation
1	<i>Avena barbata</i>	Kartli, Lower Kartli, Outer Kakheti, Kiziki, Gardabani, Javakheti, Meskheti	N 41°13'/41°32' E 42°55'/46°33'	325-1734m
2	<i>Avena clauda</i>	Dedoplistskaro in Outer Kakheti, Kiziki, Lower Kartli, Gardabani	N 41°17'/41°27' E 45°48'/46°11'	410-721m
3	<i>Avena fatua</i>	South and North and West and East Georgia; Abkhazeti, Svaneti, Adjara, Imereti, Kartli, Javakheti, Meskheti	N 41°21'/43°25' E 41°36'/45°15'	169-1800m
4	<i>Avena sativa</i>	South and North and West and East Georgia	N 40°52'/43°03' E 41°48'/46°04'	400-1400m
5	<i>Avena sativa</i> var. <i>aurea</i>	Upper Svaneti, Javakheti, Meskheti, Tusheti	N 41°21'/42°23' E 42°35'/45°39'	900-1900m
6	<i>Avena sativa</i> var. <i>krausei</i>	Upper Svaneti	N 42°59'/43°03' E 42°34'/42°63'	800-1350m
7	<i>Avena sterilis</i>	Abkhazeti, Western Transcaucasia	N 43°17'/43°25' E 40°12'/40°22'	850-1340m
8	<i>Avena sterilis</i> subsp. <i>Ludoviciana</i>	Imereti, Lower Kartli, Gardabani, Javakheti, Meskheti, Kakheti	N 41°34'/42°03' E 43°10'/44°59'	504-1400m
9	<i>Avena ventricosa</i>	Javakheti, Meskheti	N 41°21'/41°36' E 42°54'/43°26'	1325-1795m

Wild relative of cultivated *Avena sativa*, *A. sativa* var. *aurea* and *A. sativa* var. *krausei* (Poaceae) are in Georgia and it has from old period (Table 1). *A. sativa* var. *aurea* and *A. sativa* var. *krausei* are in Upper Svaneti and from old periods. Georgian crops of *Avena* are in Upper Svaneti Village Shkaleri and there are two crop species: *A. sativa* var. *aurea* and *A. sativa* var. *krausei* (Figure 1). These are made for medicinal in this historical province of Upper and Lower Svaneti. *A. sativa* var. *aurea* is as in Tusheti, Meskheti and Javakheti (Table 1). Oats – *A. sativa* occupies very small area among crop fields in a traditionally cultivated plant distributed from 300 to 1800m a.s.l. in South, North, West and East Georgia (Table 1). It is used only for horses and poultry in mountain areas of cattle breeding and is used as forage plant. Two varieties of oats have been described for Upper Svaneti: *A. sativa* var. *aurea* and *A. sativa* var. *krausei* 400 to 1400m a.s.l. Oats – *A. sativa* var. *aurea* is in Tusheti and Meskheti from 1800 to 1900m a.s.l. (Table 1).

Wild relative of cultivated species has accepted, and other species are as synonyms: *A. A. sativa* is an accepted name and synonyms are:

- a. *A. macrantha* (Hack.) Malzev
- b. *A. sativa* var. *contracta* Neilr
- c. *A. sativa* var. *glaberrima* (Thell.) Malz
- d. *A. sativa* var. *nuda* (L.) Körn
- e. *A. sativa* var. *pilosa* (Koeler) Tab. Morais

f. *A. verna* Heuze. B. *A. sativa* var. *aurea* Körn. is an accepted name in Georgia and CWR for this is *A. barbata* Pott. ex Link. C. *A. sativa* var. *krausei* Körn. is an accepted name and CWR is *A. sterilis* L.

Avena cultivated crops are the origin of the seeds material is unknown to local farmers. Genetic diversity in oat (*A. sativa*) was analyses with a set of 182 accessions collected worldwide. GP and TG are as 1A for cultivated crop plants. These crops are for medicinal and they have vitamins B1, B2, B3, B6, D and E. Oats species: *A. sativa*, *A. sativa* var. *aurea* and *A. sativa* var. *krausei*, have a low chromosome number for genes 2n=42/48 (Table 2).

The origin of seed material is unknown:

a. *A. sativa* has a low chromosome number for genes 2n=42/48 and length is 60-100cm tall, always with 3 crop species, leaf is 25-40cm and 2-3-flowers have 20-25mm for species (Figure 1:2,3 & Table 2). It is in flowers from June to July, and the seeds ripen from August to October. The most optimal temperature is 28-35 °C.

b. *A. sativa* var. *aurea* has a low chromosome number for genes 2n=42 and length is 40-100cm tall, always with 3 crop species, leaf is 20-30cm and 2 flowers are 25-30mm for species (Figure 1:1A & Table 2). Flowers are in long June-July and seeds ripen from August to September. Flowering is favored by wet weather and the temperatures of 20-25 °C.

c. *A. sativa* var. *krausei* has a low chromosome number for genes $2n=42/48$ and length is 70-100cm tall, leaf is as 30-40cm and 2-3-flowers are 40-50mm for species (Figure 1:1B & Table 2). Flowers and seeds are in long June-August. Flowering is favored by wet weather and the temperatures of 20-23 °C.

Avena species CWRs

We can make some CWRs add variety to species for crops in Georgian regions and in different arias (Figure 1; Table 1 & 2).

Table 2: CWRs species of *Avena* are name of local crops for Georgia. Length (cm), leaf (cm) and flowers (mm) are for species. Chromosome numbers are for genes synonyms species ($2n=$). Primery gene pool (GP) and Taxon Group (TG) 1B species as crop. $N=10$.

S.N	<i>Avena</i> species	Length (cm)	Leaf (cm)	Flowers (mm)	Chromosomes $2n=$	GP-TG	Name of Local Crops
1	<i>Avena sativa</i>	60-100	25-40	20-25	42/48	GP-1A TG-1A	<i>Avena sativa</i>
2	<i>A. sativa</i> var. <i>aurea</i>	40-100	20-30	25-30	42	GP-1A TG-1A	<i>Avena sativa</i> var. <i>aurea</i>
3	<i>A. sativa</i> var. <i>krausei</i>	70-100	30-40	40-50	42/48	GP-1A TG-1A	<i>Avena sativa</i> var. <i>krausei</i>
4	<i>Avena fatua</i>	80-120	30-40	25-45	14/28/42/48	GP-1B TG-1B	<i>Avena sativa</i>
5	<i>Avena sterilis</i> subsp. <i>ludoviciana</i>	50-100	40-50	25-30	42	GP-1B TG-1B	<i>Avena sativa</i>
6	<i>Avena barbata</i>	40-100	15-25	25-30	28/32/42	GP-1B TG-1B	<i>Avena sativa</i> var. <i>aurea</i>
7	<i>Avena sterilis</i>	70-100	30-40	40-50	28/42	GP-1B TG-1B	<i>Avena sativa</i> var. <i>krausei</i>
8	<i>Avena clauda</i>	30-60	20-Aug	20-30	14	GP-3 TG-3	<i>Avena clauda</i>
9	<i>Avena ventricosa</i>	30-60	12-Oct	25-30	14	GP-3 TG-3	<i>Avena ventricosa</i>

Some CWRs of 4 species are for making the cultivated crops plants:

- a. *A. fatua*
- b. *A. sterilis* subsp. *Ludoviciana*
- c. *A. barbata*
- d. *A. sterilis*

These species are considered as accepted name or subspecies of crops by some authors for Georgian Flora species of *Avena* are as synonyms:

- a. *A. barbata* is an accepted name and synonyms are in Georgia: 1. *A. barbata* var. *atherantha* (Presl.) Grossh.; 2. *A. barbata* subsp. *subtypica* Malzev; 3. *A. barbata* var. *triflora* Trabut.; 4. *A. barbata* subsp. *wiestii* (Steud.) Tzvelev; 5. *A. nuda* subsp. *wiestii* (Steud.) Á. Löve; 6. *A. wiestii* Steud.
- b. *A. fatua* is an accepted name and synonyms are: 1. *A. fatua* var. *intermedia* (F. Lestib.) Lej. & Courtois; 2. *A. fatua* var. *glabrata* Peterm.; 3. *A. fatua* var. *pilosissima* Gray; 4. *A. fatua* L. var. *vilis* (Wallr.) Hausskn.; 5. *A. meridionalis* (Malzev) Roshev.
- c. *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne is an accepted name and synonyms are: 1. *A. ludoviciana* Durieu; 2. *A. ludoviciana* var. *glabrescens* Durieu ex Godr; 3. *A. ludoviciana* var. *macrantha* Malz; 4. *A. ludoviciana* var. *psilathera* Thell; 5. *A. trichophylla* K. Köch;

CWRs are 6 species of *Avena* as accepted name and synonyms are many 25 species. The genesis of cultivated oats is no doubt linked to that of weedy as well as wild species, i.e. *A. fatua*, *A. sterilis* subsp. *ludoviciana*, *A. sterilis* and *A. barbata*. Wild oats *A. fatua* and *A. sterilis* subsp. *ludoviciana*, hybridize easily with ordinary oats *A. sativa*, and thrive under conditions close to cultivated ones, around water, and on uncompacted soils. *A. barbata* is associated with the crops of *A. sativa* var. *aurea* and *A. sterilis* accords of *A. sativa* var. *krausei*.

d. *A. sterilis* is an accepted name and synonyms are: 1. *A. macrantha* Moench; 2. *A. nutans* St.-Lag. 3. *A. sterilis* var. *glabriflora* Malzev; 4. *A. sterilis* var. *maxima* Pérez-Lara; 5. *A. sterilis* var. *media* Malzev.

CWRs of 2 species are not making the cultivated crops plants:
1. *Avena clauda* and 2. *Avena ventricosa*:

- a. *A. clauda* is an accepted name and synonyms are: 1. *A. clauda* var. *eriantha* Coss. & Durieu; 2. *A. clauda* var. *leiantha* Malz. 3. *A. pilosa* Aucher ex Durieu.
- b. *A. ventricosa* Balansa is an accepted name and synonym as *A. bruhsiana* Gruner. in Meskheti.

The common wild oats, *A. fatua* and *A. sterilis* subsp. *ludoviciana*, are associated with the crops of *A. sativa*. Cultivates of *A. fatua* and *A. sterilis* subsp. *ludoviciana* are for crop breeding and evaluation with GP-1B and TG-1B it is for distributed in as CWRs and these has chromosome number for genes of *A. fatua* $2n=14/28/42/48$; and *A. sterilis* subsp. *ludoviciana* has $2n=42$ (Table 2). *A. fatua* has a length 80-120cm, leaf 30-40cm and 2-3-flowers of 20-25mm are for species (Figure 1:4 & Table 2). Flowers are in long June-July and seeds ripen from August to October. Sprouting occurs both at low 20-30 °C and high 28-35 °C temperatures. *A. sterilis* subsp. *ludoviciana* has a length 50-100cm, leaf 40-50cm and 2-3-flowers of 25-30mm are for species (Figure 1:6 & Table 2). Flowers are in long April-June and seeds ripen from Augusts. The most optimal temperature is 15-30 °C.

A. barbata is associated with the cultivated species crop of *A. sativa* var. *aurea* and it is distributed in as CWRs as GP-1B and TG-1B. These has chromosome number for genes of *A. barbata* $2n=28/42/48$ (Table 2). *A. barbata* has a length 40-100cm, leaf 15-25cm and 2 flowers of 25-30mm are for species (Figure 1:7 & Table 2). Flowers are in April-May and seeds ripen June-July. The most optimal temperature is 15-35 °C. The seed ripens in the latter half of summer and, when harvested and dried, can store for several years.

A. sterilis accords of the cultivated species *A. sativa* var. *krausei*. *A. sterilis* has GP-1B and TG-1B and chromosome number for genes is $2n=28/42$ (Table 2). *A. sterilis* has a length 70-100cm, leaf 30-40cm and 3-5 flowers of 40-50mm are for species (Figure 1:5 & Table 2). Flowers are in July periods and seeds ripen from Augusts. Optimal temperature is 28-35 °C.

A. clauda is not making the cultivated crops plants. GP-3 and TG-3 it is distributed in as CWRs. It has a chromosome number for genes is $2n=14$ (Table 2). It has a length as 30-60cm tall, leaf 8-20cm and 2-3-flowers of 20-30mm are for species (Figure 1:8 & Table 2). Flowers are in April-May periods and seeds ripen from July. Optimal temperature is 15-35 °C.

A. ventricosa is an accepted name and synonym is *A. bruhnsiana* in Caucasian Flora. It has not as cultivated crops plants GP-3 and TG-3 as CWRs. The chromosome number for genes are as $2n=14$ (Table 2). It is as length as 30-60cm tall, leaf 10-12cm and 2-flowers of 25-30mm are for species. Flowers are in May-June periods and seeds ripen from Augusts. Optimal temperature is 28-35 °C.

Discussion

The oat genus, *Avena*, is a typical example. Some species of this genus are among the world's worst and most abundant weeds, other species are rare and endangered taxa restricted to a few islands. In a simple sum of all wild oat populations, the rare and interesting taxa would be swamped. Autogamy and apomictic species can multiply relatively few genotypes over large areas. The population sizes of such species could mislead as indicators of their standing genetic diversity [4,5].

Wild species are growing as weeds and in natural habitats and play big role in species formation processes. Two species of oats: *A. fatua* and *A. sterilis subsp. ludoviciana* are considered as close relatives of cultivated oats on the base of chromosome number and species-specific fungal disease are form separate group and are considered as well as close relative plants of *A. sativa* [11]. Oats - *A. fatua* has this species could be of importance in breeding programmed for the cultivated oats (*A. sativa*), where it could confer drought tolerance, disease resistance and higher yields. Oats are in general easily grown plants but, especially when grown on a small scale, the seed is often completely eaten out by birds. Some sort of netting seems to be the best answer on a garden scale. *A. fatua* is a species of grass in the oat genus. It is known as the common wild oat.

A. sterilis subsp. ludoviciana has the seed ripens in the latter half of summer and, when harvested and dried, can store for several years. It can be used as a staple food crop in either savory or sweet dishes. The seed can be cooked whole, though it is more commonly ground into a flour and used as a cereal in all the ways that oats are used, especially as a porridge but also to make biscuits, sourdough bread etc. The seed can also be sprouted and eaten raw or cooked in salads, stews etc. The roasted seed is a coffee substitute. Common oat is the most demanding cultivated variety of this crop as regards daylight duration. Northern cultivars need for their development longer daylight than southern ones. With 14 hours of daylight they do not head. The analysis of the harvest structure with oat cultivars grown at different photoperiods revealed longer stalks and panicles, a greater number of seeds and a higher overall weight with plants grown at shorter daylight. However, since under such condition's oat panicles emerge much later than otherwise, the seeds have no time to mature properly and are hollow. These species are weedy plants mixed with grain corns in the field [12].

A. barbata has a cultivated species of *A. sativa* var. *aurea* and it is crops in Georgia. Other is a species as *A. sterilis* and it makes as accords of *A. sativa* var. *krausei* [2]. Occurs on stony slopes, in loams, in sands, in meadows, along riversides and is as a ruderal species of plant in fields. Also occurs in plains and at the lower mountain level and in cultivated beds. Occurs is along roads, in settlements, and in fields. The roasted seed is a coffee substitute. Seeds sow *in situ* in early spring or in the autumn. Only just cover the seed. Ex situ conservation of this species will be effective to collect seeds and keep in seed banks. The local population and governmental bodies responsible for the nature protection should be informed about high conservation value of this species [5].

Treatment is used for oats in meal with ground surface and uneven grains. Oats contain magnesium that is necessary for the cardiovascular, nervous system and metabolism. This plant also contains amino acids, including glutamine acid, is rich in vitamins E, D, PP, B1, B2, B3, B6. The use of protein markers permits successful identification of genetic resources and registration when solving different problems related to classification of cultivated plants and their wild relatives. A study of protein markers of the cultivated hexaploid oat *A. sativa*, cultivated diploid species

Conclusion

Avena has a CWRs as should understand all species related to any cultivated plants, as well as to wild species of ornamental, food, fodder and forage, medicinal plants, condiments, forestry species and plants used for industrial purposes, such as oils and fibers i.e. to all plants of economic importance. Although, "classical" definition of CWR is restricted only to species related to cultivated crops, including such important field crops as *A. sativa*, *A. sativa* var. *aurea* and *A. sativa* var. *krausei*. CWRs are to species *A. fatua*, *A. sterilis subsp. ludoviciana*, *A. sterilis* and *A. barbata*. Other *Avena* 2 species are in Georgia and has not for cultivated crops *A. clauda* and *A. ventricosa*.

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