



SUSTAINABLE PRESERVATION OF INDIGENOUS SOUTH EAST EUROPEAN LEGUMES AND THEIR TRADITIONAL FOOD AND FEED PRODUCTS

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THE AIM OF INVESTIGATION IS TO ENLARGE THE GENETIC BASIS OF GRAIN LEGUME COLLECTION WITH NEW GERmplasm.

The project was carried out in two stages.

1st STAGE

- **Inventory of the available seed material of target species of grain legume collection in genebank and in the areas not covered in previous periods: pea, faba bean, checkpea, grasspea**
- **Preparation of lists of available local accessions in gene bank and itineraries for expeditions**
- **Conducting expeditions for collecting seeds from old RGR and interviews with farmers**
- **Conducting expeditions for collecting seeds from CWR**
- **Choice of habitats for *in situ* conservation**
- **Verification of germination and propagation of the collected samples**

Second stage

- **Passport information about new accessions/**
- **Filling in the gaps of local RGR and creation of *ex situ* collection**
- **Characterization**
- **Seed samples for long term storage and exchange**



Passport information about new bulgarian collected accessions of fababean

Acc.numb	year	collecting site	latitude	longitud e	altitude	sample status	farmer	storage*
A8E0001	2008	Stezhrovo, Pleven, region	435 N	25.15 E	100-199	local form	Stanka A. Lazarova	20* 13
A8E0049	2008	Kochevo, Plovdiv region	4210N	2491E	148	old variety:	Penka Georgieva	20* 13
A8E0050	2008	Nevsha, Varna, region	432495N	272828E	190	landrace	Valentina Georgieva	20* 13
A8E0415	2008	Trakiec, Haskovo, Tracian plain	415544N	252732E	219	local form	Mahmed Ali	20* 13
A8E0494	2008	Ivailovgrad, Eastern Rhodopi	413119N	260510E	150	local form	Maria Shishmanova	20* 13
A8E0529	2008	Lyubimetz, Haskovo region	414958N	263500E	108	local form	Elena Sultanova	20* 13
A8E0555	2008	Yerusalimovo, Yambol, region,	415325N	2610E	108	local variety	Jivka Koleva	20* 13
A8E0564	2008	Kapitan Andreevo	414258N	264818E	65	local variety	Sofia A. Dimitrova	20* 13
A9E0289	2009	Hitovo Dobritch region	43783N	27567E	172	local variety	Ivan Petrov	20* 13
A9E0301	2009	Hitovo Dobritch region	43783N	27567E	172	local form	Tatiana Petkova	20* 13

20 collection missions were carried out in the period from 23.06 2011 to 30.08 2012 for collecting local grain legumes PGR and wild relatives.

Were visited 19 districts in the country following major itineraries: National parks” Central Balkan”” and “Strandja”; Mountains Sredna Gora, East and Central Rodopi, Sakar and the different regions of South and North Bulgaria.

The organization of a large number of expeditions in this short period is motivated by two main reasons

- Our villages were depopulated and therefore data collection and storage of seed was necessary. Local farmers keep seeds in freezer, jars and bags
- Previously collected data shows that only local sources of fababean and beans maintained in many places for personal use in gardens

EXPEDITIONS WERE CONDUCTED IN TWO WAYS:

- ✓ Interviews with farmers about the tradition of growing and foods.
- ✓ Collecting seeds in the presence of quantities

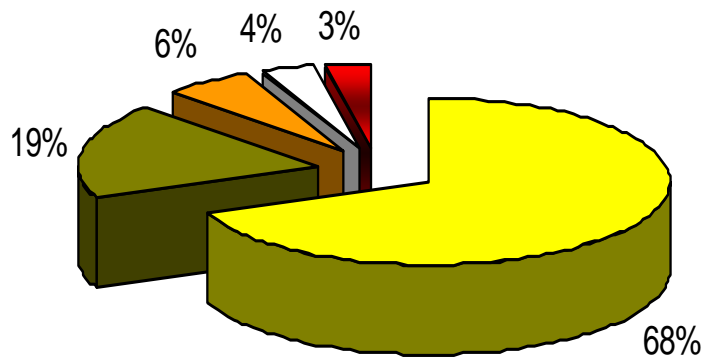


- ✓ Identification of natural habitats for rare and endangered species of legumes and description of habitats for *in situ* conservation. Possibility for collecting CWR seeds for ex situ collection.



105 samples were collected from old varieties, forms, populations of fababeans, beans, chickpea, pea, vigna which are still kept and maintained by the local

Collected local PGR of Grain legumes -
105 number



- Vicia faba- 72 accessions
- Phaseolus vulgaris – 20 accessions
- Cicer arietinum – 6 accessions
- Pisum sativum – 4 accessions
- Vigna unguiculata - 3 accessions

- Finally we visited the areas where traditionally grown and still keep fababeans. This is the region of Veliko Tarnovo: Lyaskovets - Kelifarevo – Djulyunitsa



**In Lyaskovets is a museum of Bulgarian gardeners.
You can see photos and seeds of the very old crop
in our country**



Habitats are found in Strandja Mountain for *in situ* conservation of two rare species for Bulgaria

Cicer monbretii, *Vicia incisa*

and

Trifolium constantinopolitanum.

Of them were collected seeds for *ex situ* collection.

A few years ago was identified species *Lens evroides* near the village of Kosti. In our expeditions /2011-2012/ this habitat was not confirmed, regardless of the exact coordinates we have.



Cicer montbretii



STRANDZA MTS.



Vicia striata Bieb.



Vicia incisa Bieb.

Habitat and population of *Cicer montbretii* * in National Park “Strandza”

The typical colchic woods are comprised of tree-species like *Quercus hartwissiana*, *Q. pontica*, *Q. imeretina* (= *Q. robur* ssp. *imeretina*), *Fagus orientalis*, *Picea orientalis*, *Abies nordmanniana* as well as the typical evergreen undergrowth: *Laurocerasus officinalis*, *Rhododendron ponticum*, *Vaccinium arctostaphylos*, *Staphylea colchica*, *Smilax excelsa*, *Buxus colchicus*

3 EXPEDITION MISSION

- Identification: 2011 - April and May 2012
- Collection of seeds: June, 2012

Coordinates: altitude 198 m ; 420110,3 N; 0273635,1E — in the region of Gramatikovo;

Status - Protected plant species

Populations: limited distribution and small populations, near roads
single and groups of plants occupy small areas on the order of 10-20 m².

Habitat: dry stony and grassy sites near oak woods and eroded slopes near roads Grasses
and *Amorpha fruticosa*



In the Rhodope Mountains have identified areas for the *in situ* conservation of the species *Medicago rhodopea*, *Vicia onobryhoides* and *Vicia tenuifolia*.

These two *Vicia* sp. are perennial and widespread in the Eastern Rhodopes, but not maintained in *ex situ* collection because pods are highly shattering.

In 2006, individual plants were found of *Lupinus graecus* in the Eastern Rhodopes /Municipality Krumovgrad/. Unfortunately this information not confirmed by the recent expeditions. We do not have the exact coordinates.



In 2007 was identified habitat with *Pisum elatius* in Kaliakra reserve. The collected seeds of this species could not grow and we have lost.

We have not visited the place during flowering, and no information on habitat.

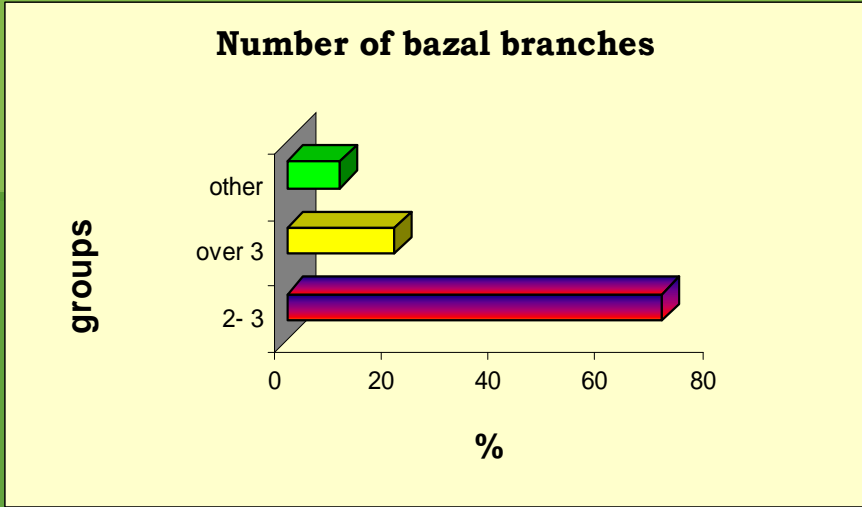
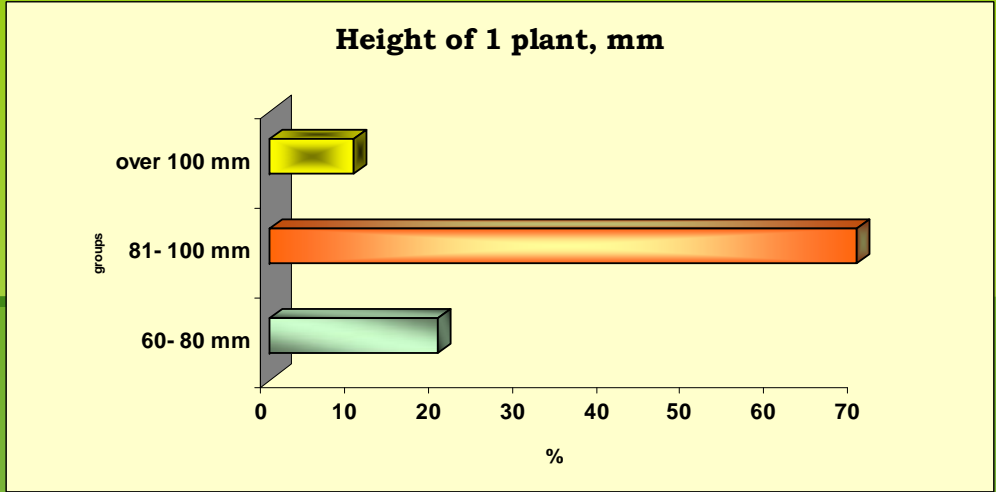


Collecting local RGR in 2010 and 2011 were evaluated by morphological and economic indicators.

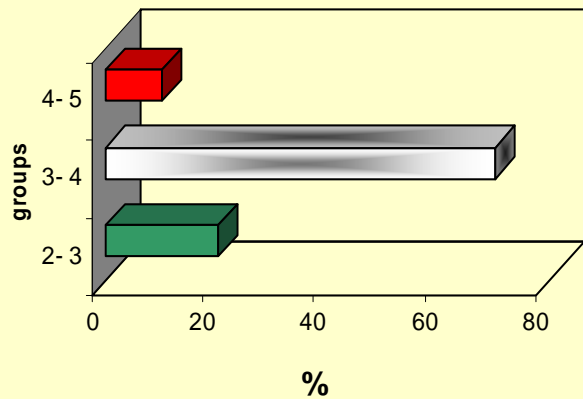
Collected in 2012 will reproduce and evaluate the next two years.

According to available morphological evaluation the accessions are distributed by

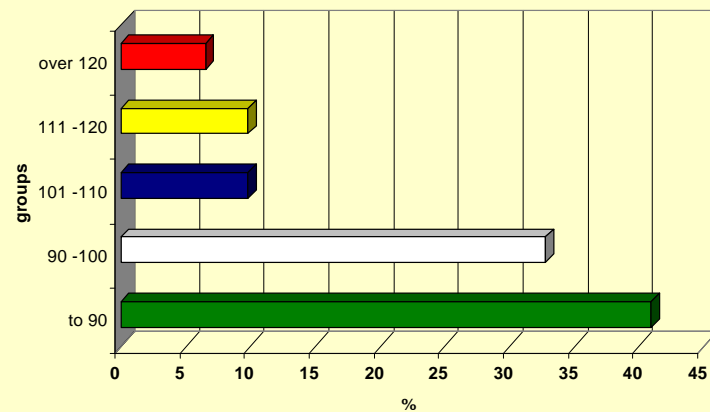
**high of plant,
branching, leaf size,
pod size, seed size, seed color etc.**



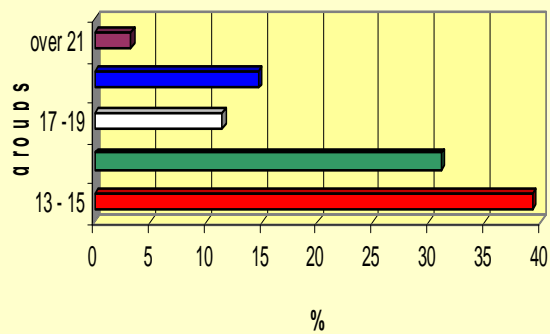
Number of seeds/pod



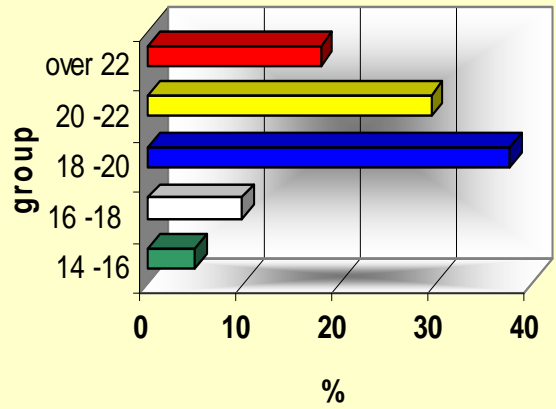
Length of pod, mm



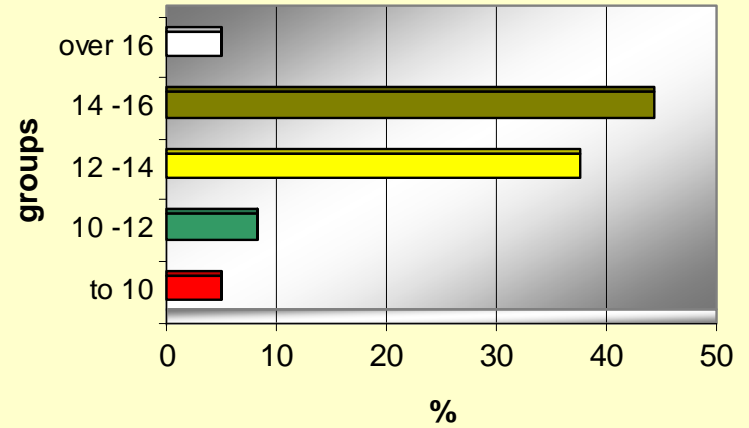
Width of pod, mm



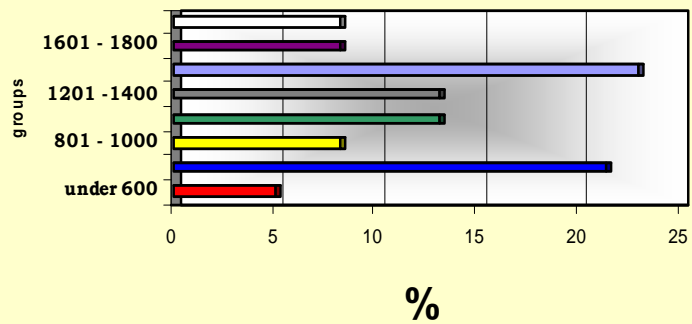
Length of seeds, mm



Width of seeds, mm



Mass of 1000 seeds, g



Elements of productivity

1. Number seeds per plant

<i>Fababean</i>	: min: 20	max 112
<i>Checkpea</i>	: 37	80
<i>Grasspea</i>	: 4	123



2. Weight seed per plant

<i>Fababean</i>	: min 23,3	max 109 g
<i>Checkpea</i>	: 8,5	30,4
<i>Grasspea</i>	: 1,3	23,6

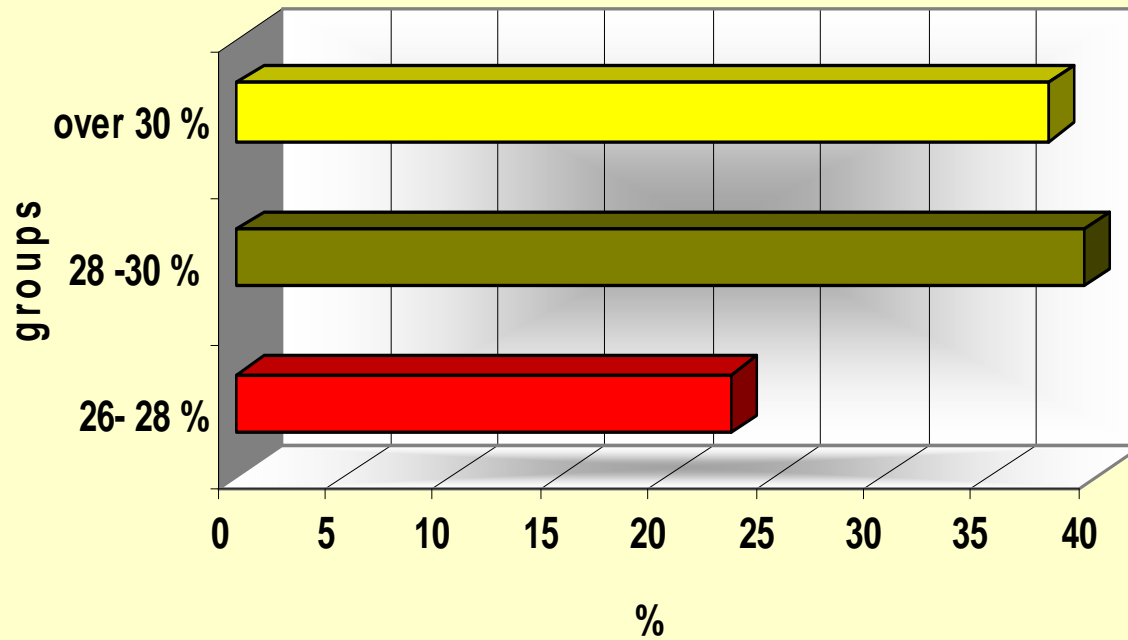


3 Weight of 1000 seeds

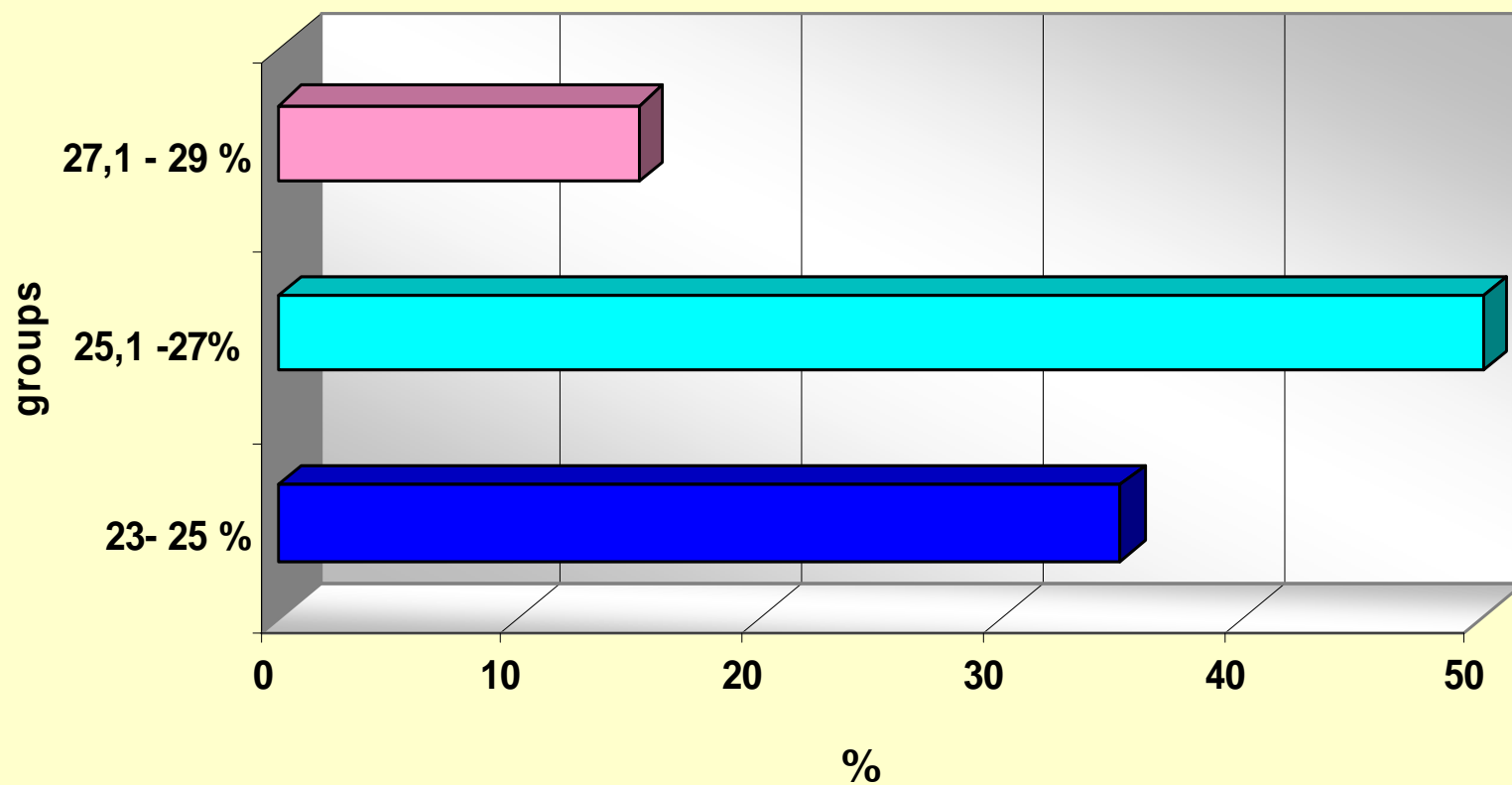
<i>Fababean</i>	: min 600	max 1910 g
<i>Checkpea</i>	: 213	480
<i>Grasspea</i>	: 20,4	268,6



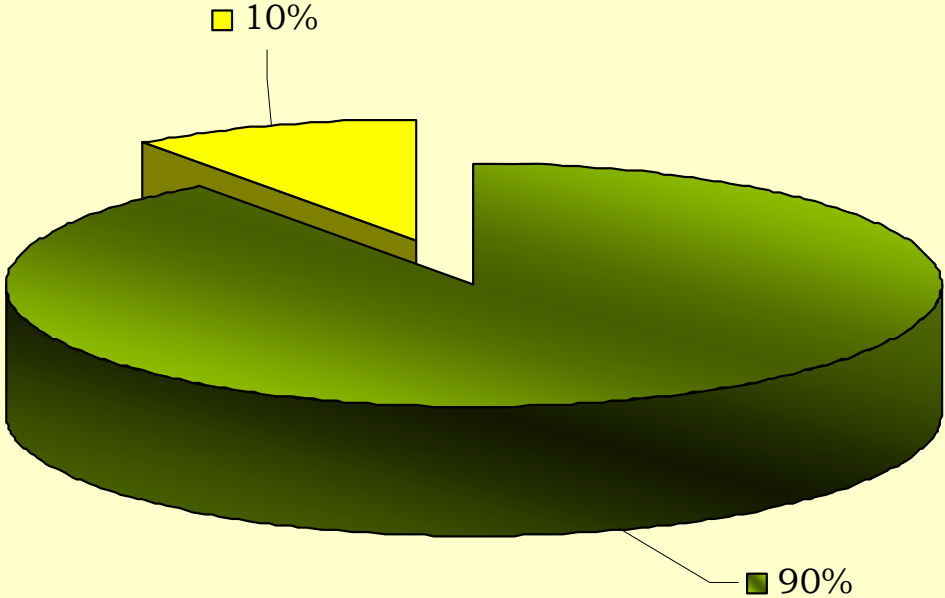
Distribution of collecting samples of Faba bean for crude protein



Distribution of collecting samples of Pea for crude protein

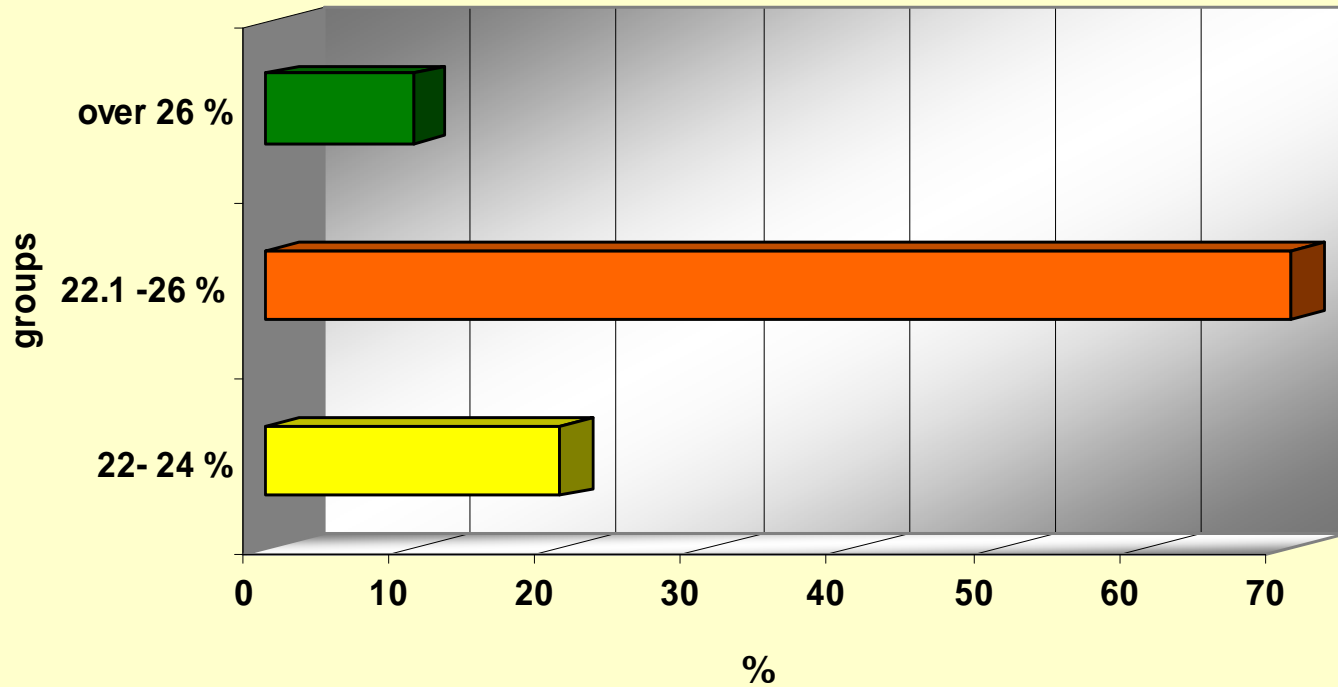


Distribution of collecting samples of Lathyrus sativa for crude protein



■ 30- 32 % ■ over 32 %

Distribution of collecting samples of *Cicer arietinum* for crude protein



21 NUMBER COLLECTED CWR

Vicia sativa – 4

Vicia sepium – 2

Vicia incisa – 1

Vicia tenuifolia – 3

Vicia grandiflora – 3

Vicia striata-2

Vicia villosa-3

Lathyrus sativus – 1

Lathyrus cicera - 1

Cicer monbretii -1

IN SITU CONSERVATION - HABITATS

Vicia onobryhoides

Vicia incisa

Vicia amphycarpa

Vicia tenuifolia

Vicia cracca

Cicer monbretii

Lathyrus pratensis

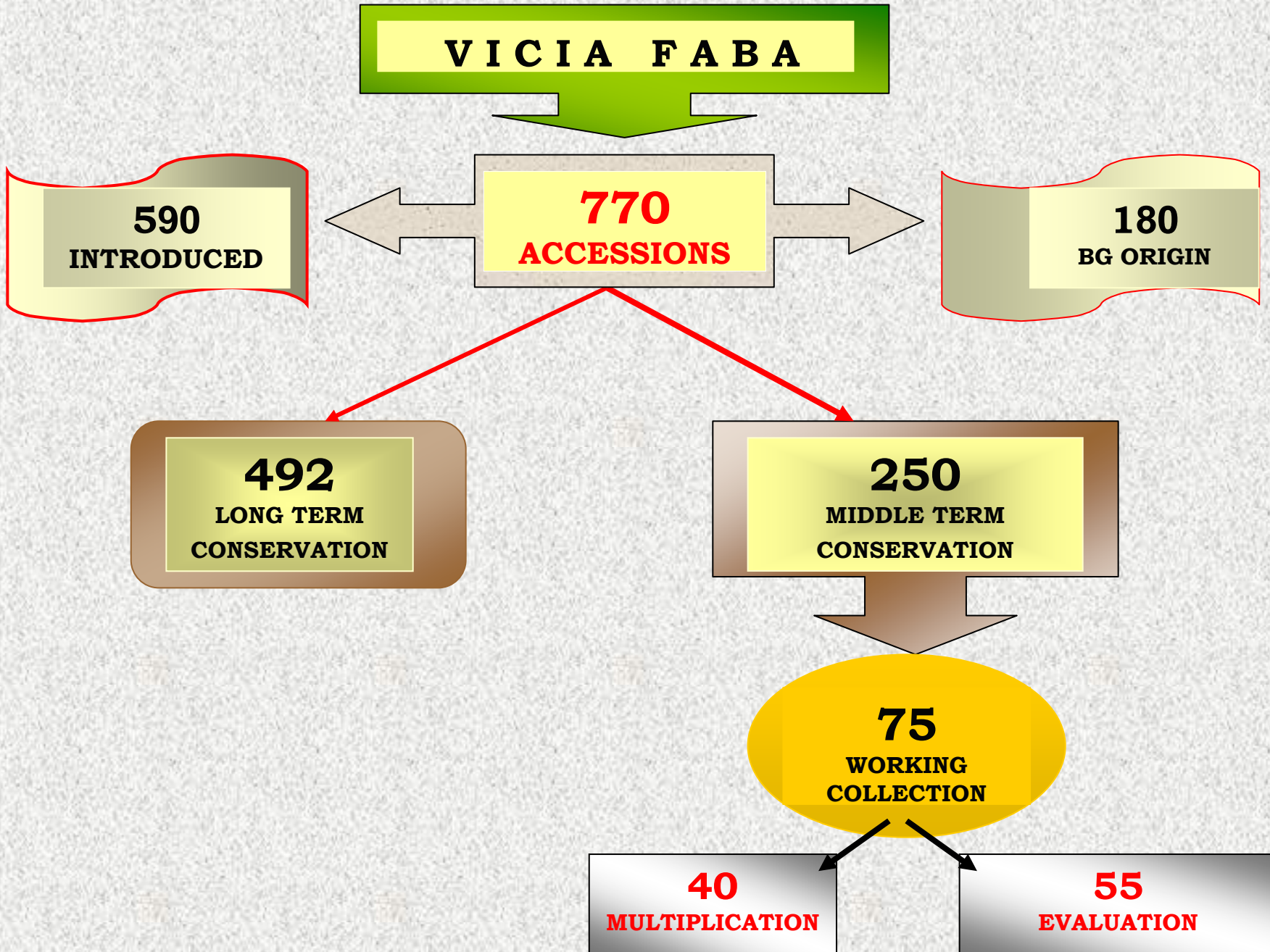


Currently in Bulgaria are mainly preserved and maintained old RGR of fababean and beans.

In other types of grain legumes: *peas, lentils, vetch, chickpeas* in some areas can still be found in several samples.

The protection of the **CWR** is extremely important for breeding the new cultivars for giving cold tolerance, drought and disease resistance

VICIA FABA





Vicia Faba - local



B 1 E 238



Vicia Faba



B 0 E 095



Vicia Faba - local - 2



B 1 E 0236



B 1 E 0214

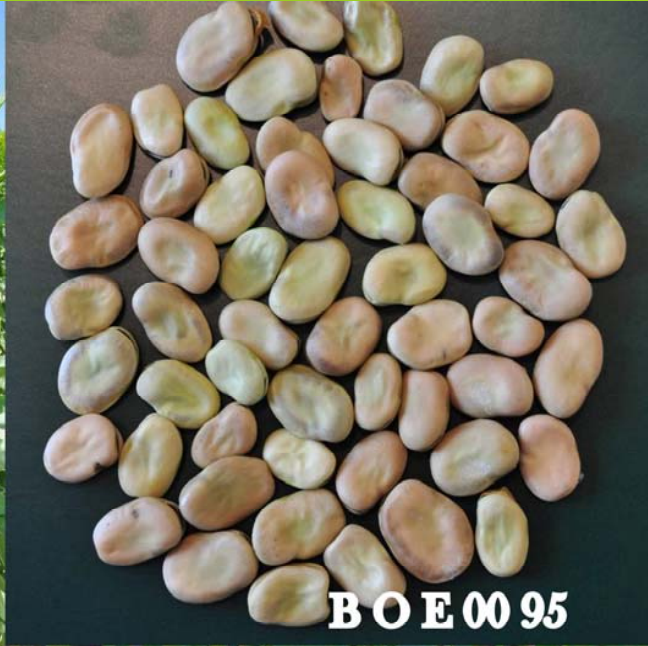


B 1 E 0231



B 1 E 04 33







B 1 E 02 34



BGR 37346



■ **Asenovgrad region**
v. Bolyartzi- Maria Stoyanova



- **High of plant : 95 – 100 cm**
- **Number of pods/pl. – 8 - 10**
- **Size of pod: 84,4/ 16.8 mm**
- **Size of seed: 18,2/ 12.2 mm**
- **Number of seeds/pod: 3-4**
- **mass of 1000 seeds: 919 g.**

Young pods are cut into small pieces

Make a separate roux with onions, paprika and oil.

After a few minutes have to put fababeans

Add the cold water and boil on low heat

Liaison with 1 egg, 4 spoons yogurt and 1 spoon flour

It is served with garlic and lemon juice

Spices: mint and parsley

Soup Northern Bulgaria

Young pods are cooked with onion, garlic. After 20 minutes add green plums.

Spices: mint, fresh savory. Make a roux with paprika and oil.

Stew Northern Bulgaria

Used green seeds. Boil until soft. When the green seeds are ready have to add roux, which is made with onions and 1 spoon tomato paste. You can add hot pepper. Spices: fresh parsley.

Specialty (Appetizer) from southern Bulgaria –

Municipality Karlovo

Used dry bean seeds with large seeds.

Soaked to the separation of the shell

(24 hours) they are cooked.

**Prepare a homogeneous mixture of spices
of your choice. Add an onion, garlic, oil
and cheese.**

**Bake in moderate temperature - 30
minutes.**

Passport information about new Bulgarian collected accessions of fababean

Acc.numb	year	collecting site	latitude	longitude	altitude	sample status	farmer	storage*
A9E05211	2009	Tzenovo, Russe	43533N	2565 E	49	local		20* 13
B0E0001	2010	v. Sinitovo, Pazardzhik	4215 N	24 367 E	195	landrace	Dimitria Todorova	20* 13
B0E0002	2010	v. Sinitovo, Pazardzhik	4215 N	24 367 E	195	landrace	Nasko Dimitrov	20* 13
B0E0003	2010	v. Sinitovo, Pazardzhik	4215 N	24 367 E	195	landrace	Lubka Dimitrova	20* 13
B0E0004	2010	v. Buzhurluk	43533N	25183E	113	local form	Ilka Ilieva	20* 13
B0E0005	2010	v. Karadzhevo, Plovdiv region	42 10 N	24 90 E	164	old variety	Boris Stefanov	20* 13
B0E0006	2010	v. Suvorovo, Varna region	43333N	2760E	246	old variety	Gergi JeleV	20* 13
B0E0011	2010	Yambol	424833N	26 51 E	114	old variety	Dimitar Andonov	20* 13
B0E0012	2010	v. Kozarevo, Yambol region	4245N	2651E	195	landrace	Dimitar Andonov	20* 13
B0E0016	2010	Troyan	42 53 N	24,23 E	395	old variety	Tzenka Minkova	20* 13
B0E0093	2010	Plovdiv-pazara	21433N	247510	130	old variety	Sofia Petrova	20* 13
B0E0094	2010	v. Markovo, Plovdiv region	42067N	2470E	300	landrace	Venera Timareva	20* 13
B0E0095	2010	Yambol	424833N	26 51 E	114	landrace	Yana i Georgi Panayotovi	20* 13

Acc.numb	year	collecting site	latitude	longitude	altitude	sample status	farmer	storage*
BOE0097	2010	Sadovo, Plovdiv region	42 133N	24 933 E	199	old variety	Dimitriya Hristeva	20* 13
BOE0131	2010	v. Arbanasi, tarnovo region	430978320N	256683E	400	local form	Todorka Iv. Atanasova	20* 13
BIE0213	2011	v. Sinitovo, Pazardzhik	42 15 N	24 367 E	195	local form	Evgeni Todorov	20* 13
BIE0214	2011	v. Miryantzi, Pazardzhik	4215 N	24367 E	195	local form	Maria Jonova	20* 13
BIE0215	2011	v. Miryantzi, Pazardzhik	4215 N	24367 E	195	local form	Dimitar Jonov	20* 13
BIE0216	2011	v.Varvara, Pazardzhik region	4215N	24133E	400	local form	Ivanka Petrova	20* 13
BIE0217	2011	v. Varvara, Pazardzhik region	4215N	24133E	400	local form	Dragan Jonov	20* 13
BIE0218	2011	v. Tzrantcha, Pazardzhik region	4210N	24217E	320	local form	Petar Todorov	20* 13
BIE0219	2011	v. Lyahovo, Pazardzhik region	4215N	24233 E	230	landrace	Dimitrina Ivanova	20* 13
BIE0227	2011	Kuklen Monastery	42083 N	24783 E	393	landrace		20* 13
BIE0229	2011	Sadovo, Plovdiv	42 133N	24 933 E	123	old variety	Zapryana Hristova	20* 13
BIE0231	2011	v. Kochovo, Plovdiv	4210N	24917E	167	old variety	Maria Koleva	20* 13

Acc.numb	year	collecting site	latitude	longitude	altitude	sample status	farmer	storage*
B1E0234	2011	v. Bolyartzi, Plovdiv	42067N	24967 E	177	old variety	Veska Bakalova	20* 13
B1E0235	2011	v. Karadzhovo, Plovdiv	42 10 N	24 90 E	164	old variety	Mariika Pamukova	20* 13
B1E0236	2011	v. Yagodovo, Plovdiv	4210 N	2485 E	160	old variety	Spaska Dicheva	20* 13
B1E0237	2011	v. Meden kladenez, Yambol	423166N	263166E	199		Darinka Ruseva	20* 13
B1E0238	2011	Proslav-market, Plovdiv	21433N	247510	130	old variety	Maria Sabeva	20* 13
B1E0239	2011	Proslav, Plovdiv	21433N	247510	130	old variety	Fotinka Slavova	20* 13
B1E0432	2011	Troyan	42 53 N	24,23 E	395	landrace	Tzenka Minkova	20* 13
B1E0433	2011	Mominsko, place "Kabata"	42067N	2490E	199	landrace	Syulejman Syuleiman	20* 13
B1E0434	2011	v. Bolyartzi	42067N	24967 E	177	landrace	Maria Stoyanova	20* 13
B2E0129	2012	v. Svetlina, obl. Sredetz	42367N	2719 E	99	landrace	Maria Stoyanova	20*
B2E0130	2012	v. Zornitza, obl. Sredetz	423833N	269333E	199	landrace	Stanka Andonova	20*
B2E0131	2012	v. Svetlina, obl. Sredetz	42367N	2719 E	99	landrace	Minka Abrasheva	20*

Acc.numb	year	collecting site	latitude	longitude	altitude	sample status	farmer	storage*
B2E0132	2012	v. Hlyabovo, Topolovgrad, Sakar mount.	4205N	2625E	404	landrace	Retyo Momchev	20*
B2E0133	2012	v. Lyubanova mahala, Radnevo, St. Zagora	42.35 N	25.96.66E	199	landrace	Buska Miteva	20*
B2E0177	2012	v.Bolyarci,Plovdiv region	4210N	24917E	167	old variety	Vesska Bakalova	20*
B2E0178	2012	Kesarovo,Tarnovo region	43.15N	25.967E	50 - 99	landrace	Aneta Varbanova	20*
B2E179	2012	Lyaskovetz	43.11111N	: 25.72833E	200-299	landrace	Mintcho Radanov	20*
B2E0180	2012	Kilifarevo,Tarnovo region	42.983N	25.633E	200 - 299	landrace	Marin Georgiev	20*
B2E0181	2012	Djulunica,Tarnovo region	43.15N	25.91667E	50 - 99	landrace	Pavlina Siderova	20*
B2E0194	2012	Sadovo,Plovdiv	42.133N	24.933E	100 - 199	old variety	Tinka Deltcheva	20*
B2E0195	2012	Mominsko,Plovdiv region	42.067N	24.9E	100 - 199	old variety	Maria Spassova	20*
B2E0196	2012	Mominsko,Plovdiv region	42.067N	24.9E	100 - 199	local form	Magdalena Ivanova	20*

Notes: Storage: 20 work collection

13 long term storage

RESULTS

- **Enlarge** the genetic basis of the collections
- **Develop** the recommendation for management of natural resources
- **Monitoring** for rare species
- **Multiplication** of newly collected accessions
- **Conservation** of seeds in the gene bank and exchange.
- **Reintroduction** of traditional old PGR for regional food product.
- **Involving farmers and producers** in *on farm* conservation and multiplication of old varieties



THANK YOU