



ევროკავშირი  
საქართველოსთვის

Project funded by the European Union

**SITUATION AND PROSPECTS OF THE  
APPLE VALUE-CHAIN IN GEORGIA  
THINK AND ACT TOGETHER**



**Zviad Bobokashvili**

**PhD, Associate Professor, Head of Fruit crop Research  
department**

“Apple local Biodiversity of species: Genetic and commercial  
opportunities for development”





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სოფლის მეურნეობის  
საპროცესინგო-კვლევითი ცენტრი  
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SRCA -

Scientific – Research center of agriculture

**Zviad Bobokashvili**

PhD, Associate Professor, Head of Fruit crop Research department

# Apple local Biodiversity of species: Genetic and commercial opportunities for development

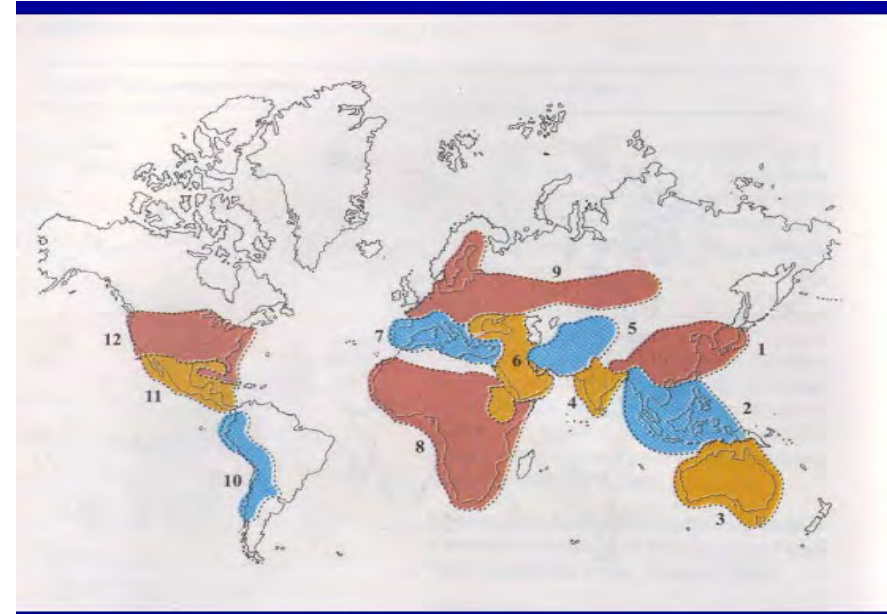




## Fruit crop origin centers



According to Vavilov (1926) - 8  
centers of origin (2 sub-centers)



According to Zhukovsky (1975) -  
12 biodiversity megacenters

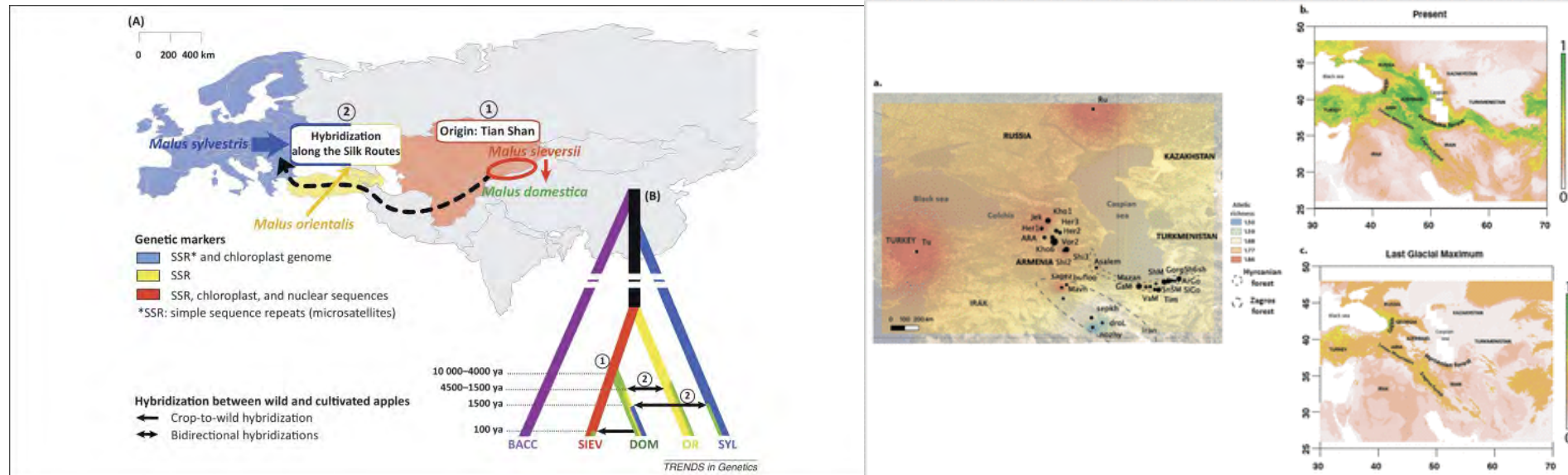
- **GEORGIA BELONGS TO**
- **IV center of species origin according to Vavilov**
- **9th Center for Biodiversity according to Zhukovsky**



# Apple *Malus domestica* Domestication

M. Sieversii - 90-98 % of the genome

M. Orientalis and other species - 2 - 10%



Source : \_ A. Cornille , T. Giraud, M.Smulders and others  
The domestication and evolutionary ecology of apples ,  
2013

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The domestication and evolutionary ecology of apples , 2013



## Georgia - Origin and biodiversity of fruit and berry crops An important center

- Many species of fruits and berries are descended from species in the South Caucasus and wild (wild) ancestors.
- Primary gene pool of origin ( GP-1 A ) is obtained here And as well presented Ancestor wild relatives Plants ( GP -1 B ). There are most important representatives of the groups:
- **Pome fruits** - Apples ( *Malus domestica* , *M. orientalis* ), pear ( *Pyrus communis* , *P. caucasica* ), in quince ( *Cydonia oblonga* ) , Sea urchin ( *Mespilus germanica* ) ,
- **Stone fruits** - Plum ( *Prunus domestica* , *P. domesticavar . insititia* , *P. spinosa* ) ,
- Alucha myrobalan ( *Prunus vachushti* ) , tkemali ( *Prunus cerasifera var. divaricata* ) , Bali ( *Prunus avium* , ) , cherries ( *Prunus cerasus* ) , Fennel ( *Cornus mas* ) , mulberry ( *Morus alba* , *M. nigra* ) , pomegranate ( *Punica granatum* ) and others
- **Berries** - Raspberry ( *Rubus idaeus* ) , currant ( *Ribes rubrum* , *R. nigra* , *R. alpinum* , *R. biebersteinii* ) , bladder nut ( *Staphylea pinnata* ) ,
- **Nuts** - nuts ( *Corylus avellana* ) , walnut ( *Juglans regia* ) and chestnut ( *Castanea sativa* )



## Gene pool of local (autochthonous) apple varieties

- Originated from natural selection under given ecological conditions by folk , the author is unknown (land race)
- Presented by *Malus Orientalis* ( Majalo apple) with different hybrid populations with *M. Domestica* .
- Presented from seedlings of unknown origin
- Varieties bred by local breeders - the author is known
- The main regions of origin are: Samtskhe-Javakheti, Adjara, Kartli, Imereti and Racha



## Number of local apple varieties

- up to 60 based on 1980 data
- However, the number of unnamed forms reached 100.





## The current state of local apple varieties - erosion of diversity

- Commercial assortment of apples - 3 local varieties - Kekhura, Georgian mustard, Goruli mustard - is decreasing
- The number of locally named varieties has been alarmingly reduced
- The knowledge about the old autochthonous varieties is on the verge of complete loss in the population
- The form of introduced varieties as local varieties is very common, numerous examples of this have been collected during germplasm expedition studies .
- Introduced varieties are sometimes called originator names in the region and are mistaken for locally bred varieties.
- To avoid errors, it is necessary to involve qualified pomologists in this type of research in order to avoid making unjustified mistakes when finding local varieties.
- It is necessary to use molecular express methods to specify synonyms and homonyms.





## Local apple germplasm collections in Georgia

- SRCA, Jigaura - more than 80 varieties and forms, year of establishment, 2020
- Elkana, more than 25 varieties and forms, year of foundation, 1998 -2002
- Agroservice Center, Adjara - 15 varieties and forms, year of establishment - 2012-2014
- Agrarian University, - 40 varieties and forms, year of foundation, 2017



# Collection of local fruit varieties

- **20** new genotypes were added to the collection of local fruit orchards - a **total of 192 specimens**, of which **105 specimens are apples**.
- collection includes endangered apple varieties , such as: Abilauri , Demir-alma, Pash-alma, Erbo apple, fat, cucumber apple, Tatena, Karafila , Meskhetian Turashauli, Khvintsa, Shakarnabada etc





## Local varieties - Pros

- Exceeds commercial varieties - adaptability (late flowering, high winter hardiness, drought resistant)  
- (Georgian mustard, etc.)
- Better resistance to diseases
- Sometimes with taste properties (Shakarnadabada, Shakara)
- Sometimes with storage capacity (Kekhura)



## Case study 'Kekhura' - potential 60 - 100 tons / ha, storability – till august next Year





# Local varieties - disadvantages

- Local varieties can not compete with commercial varieties
  - In the attractiveness
  - Yield
  - In terms of use in intensive orchards
  - With taste properties
  - Sometimes with storage capacity
  - By user awareness
  - Marketing demand



## Local biodiversity use / development strategy

- Material as for breeding purposes
- Use of molecular modern methods of genetic identification
- Database sharing
- National Coordination
- Cultivation of small collection orchards for tourist attractions
- Finding enthusiasts for planting
- Desimination of bud material for propagation after initial identification



## Commercial prospects

- Organic production for fruit growing - use of some local varieties resistant to diseases
- For the production of local varieties in specific microzones - Georgian Sinapi (late flowering) and summer apple
- It is necessary to popularize local varieties to raise awareness through publications and Internet social media



## Current results of local varieties research

- By studying the Georgian local gene pool, it is possible to distinguish interesting forms and send back to the industry

Some of interesting Apple varieties were selected by research selection : Achabetura and summer apple

These varieties are characterized by high commercial and production potential





# Characterization of some selected varieties



## Achabetura

- Local seedling , most likely Kekhura. It has been spreading since the 80s of the last century. It was first planted in collections in 2008.
- The tree is of medium or strong growth, enters the medium-term period of fruiting, is high-yielding, the fruit is round, slightly flattened, large - more than 200 grams, scarlet-red, harvested in the second half of October, stored until April-May.



# Characterization of some selected varieties

## Summer apples



- Local apple seedling. It has been found on Shida Kartli plots since the 80s of the last century.
- It was first planted in collection in 2008.
- The tree is of medium growth, enters early fruiting, is highly productive,
- Fruit round, medium-large size more than 155 - 160 grams, dark attractive red color,
- Harvested in the first half of August.



## Promising varieties and forms for production

- ‘Shakarnabada’ - high yield, distinctive taste and color
- Georgian Sinapi
- Clones of summer apples
- The so-called Seedlings of Natsara apples



## Finding local varieties

- If you think you have any old apple varieties or other fruit leftovers - it is better to name
- Contact us and we will put it in the collection after the initial identification
- Contact person - Zviad Bobokashvili



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## Scientific-Research Center of Agriculture SRCA- Activities

- Arranging a collection of local fruit varieties
- Introducing and testing new varieties
- 2 D "Plain" orchard - experiments
- Use of drones





# Strengthening the sector - current agronomic tasks

- Introducing and testing new varieties
- Introduction and testing of new rootstocks
- Reducing the Negative Impact of biennial bearing - By Testing Different Agents of Dorms or New Approaches
- 2 D "Plain" orchard - experiments
- Develop adaptive versions of fertilization systems
- IPM – Apple Scab ( *Venturia Inaequalis* ) and other pathogens
- Research on the use of new agents to reduce spring frosts



# Apple Sector Development SRCA - Vision

- Identify basic problems
- Solving technical-agronomic issues – production
- Improving post-harvest handling and storage technologies
- Improving Regional and Export Marketing - Organizing Apple Festivals and Exhibitions
- Promote apple consumption locally



**QUESTIONS ?**  
**Thank you for your attention!**



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შეკითხვები ???

გმადლობთ ყურადღებისთვის

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