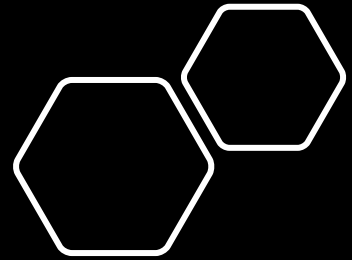


Geography and origin of cultivated plants

- Submitted by DR. MONICA SINGH CHAUHAN(Guest lecture)
- Class: B.Sc.(H) Zoology Sem: IV
- Paper Name: GE(Economic Botany and Plant Biotechnology)
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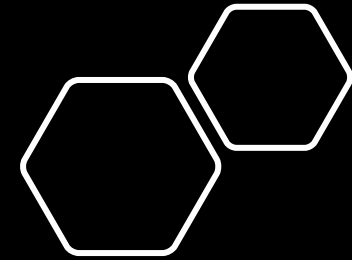
Important points

- **Crop plants – the useful plants that were domesticated, bred and cultivated extensively by humans**
- **Not all the plants were/are directly useful**
- **Wild plant diversity (Hot spots) vs crop diversity (Centers of origin)**
- **Crop domestication vs loss of biodiversity**



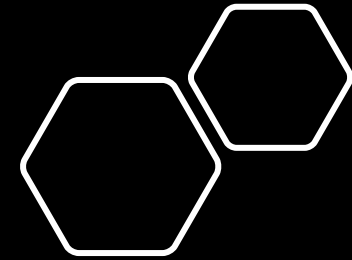
Concept of Centers of origin

- **Nikolai Ivanovich Vavilov (1887-1943)** was basically a **geneticist and plant breeder**, approaching the problems of cultivated plant species in terms of the diversity within and between them that might be put to practical ends. For this reason Vavilov was not particularly interested in diversity as such, but only in the diversity that could be put to **practical advantage**.

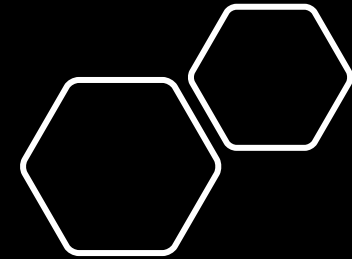


#Vavilov's work

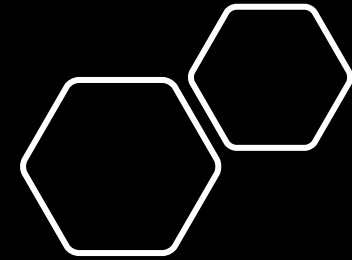
- Vavilov was a follower of de Candolle
- He travelled over hundred locations around the world for germplasm collection and study crop variability
- In 1920 he proposed *the law of homologous series of variation*, which states that the related species share certain common characters. Therefore, a character found in one species is expected to be observed in related species in a particular geographical area. Eg absence of ligule in wheat and rye in Northern part of central Asia, while present in other regions



- Vavilov noted that the centers of origin of cultivated plants occurred mostly in mountainous regions between the Tropic of Capricorn ($23^{\circ}28'$) south of the equator and about 45°N of the equator in the Old World. In the New World crop domestication occurred between the two tropics (Cancer and Capricorn) approximately. In all cases agricultural origins and primitive diversity occurred in high and complex mountain regions. Why only these?

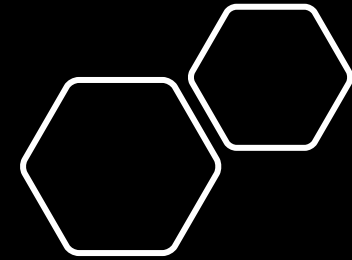


- Vavilov was able to pinpoint the exact areas where crop plant diversity showed us the centers of origin of world crops.
- Vavilov considered that “as a rule the primary foci of crop origins were in mountainous regions, characterized by the presence of dominant alleles.” In his work entitled *The Phytogeographical Basis for Plant Breeding (Vavilov 1935)* he summarizes and pulls together all his previous work on centers of origin and diversity. In this he recognizes eight primary centers, as follows. These centers are still recognized in spite of several arguments against them. Combining the concepts of centers of origin and centers of diversity, Zhukovsky (1965) proposed 12 regions of crop diversity or megacenters with some microgene centers



#Centers of origin (Vavilov)

- **Primary Center, where the crop has been actually domesticated- expected to be centers of diversity (8 primary centers)**
- **Secondary Center, where it has been introduced from primary center and adapted to show high variation – often showing higher diversity of a particular crop than in its primary center (3 secondary centers)**





Vavilov Centers of Origin - regions of the world where major food crops were domesticated.

Hartlan, J.R. 1976. The plants and animals that nourish man. Sci. Am. 235 (3): 88-97. Sept 1976 by Scientific American, Inc.



Limitations of Vavilov's View

The expansion of our understanding on cultivated plants pointed certain limitations on Vavilov's views.

These views require some modifications, Vavilov considered the region with greatest genetic diversity of a species as the centre of origin of that species. But now, many such species are known whose centres of origin and genetic diversity are different. For example, Maize and Tomato.

The centres of origin of cultivated plants as per Vavilov are limited to the mountains and small hills in tropical and sub-tropical regions. But recent evidences also suggest plains as the centres of origin of many cultivated plants.

Today several crops are known whose centres of origin are different from the ones suggested by Vavilov. Moreover there is more than one centre of origin. Also, the origin of many of the species cannot be traced due to lack of sufficient evidence.

According to Vavilov primary centre is marked by high frequency of dominant alleles towards the centre and recessive towards the periphery. But this view is not acceptable as per the latest knowledge.