

Ministry of Higher Education  
Salahaddin University  
College of Agricultural Engineering Sciencies  
Field Crops and Medicinal Plants Department



**Principles of Field Crops**  
**Second Grade**  
**Fall Semester (2022-2023)**  
**Instructor: Saber Wasman (PhD)**  
**Lecture 1**

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## Principles of Field Crops



### Meaning of Agriculture

Agriculture is the branch of applied science. The term agriculture has been derived from the Latin word 'ager' meaning land or field and 'culture' which means cultivation i.e., the science and art of production crops and livestock for economic purposes.



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It is also referred as the science of production crops and livestock from the natural resources of the earth.

The diverse branches of **agriculture** are as follows: agronomy, horticulture, entomology, plant pathology, plant physiology, soil chemistry, agricultural economics, agricultural engineering, plant breeding and animal husbandry.

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## Meaning of Agronomy



- The word agronomy has been derived from two Greek words 'ager' which means field and 'nomos' which means to manage.
- Literally, it means the art of managing fields. More precisely, it can be **defined** as the branch of agriculture which deals with scientific crops production and soil management.
- The central theme of agronomy is soil-crop relationship.
- For crops without soil cannot be considered and soil without crop is barren. In the present context, agronomy can be seen as art, science and business.

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## Field Crops Identification



It is the plant that is sown by wide areas and product the seeds which can be stored for a long time. Crops that are grown on a huge open land, their growth habit are determinate, as the flower and mature at one time therefore, they harvest at one time with an **exception** to this rule, cotton or tobacco leaves which can pick more than one time, also field crops tolerate transportation and longer storability than other crops.

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## Geographical origin of field crops



- Field crops like all other cultivated food plants are believed to have been derived from **wild species**. They were adapted to the needs of man long before the dawn of recorded history.
- **Vavilov** determined the center of origin of a crop by finding the origin where greatest diversity of type occurred in the crop.
- **DeCandolle** concluded that 199 cultivated plants originated in the Old World, and 45 in America.

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The crop plants originated to **America** included potato, sweet potato, field bean, sunflower, maize, and tobacco.

**Eurasia** yielded wheat, barley, rye, oats, millet, rice, peas, soybeans, sugar beets, sugar cane and most of the cultivated forage crops, sorghum and cowpeas seem to be indigenous to **Africa**.

It has been also reported that corn, beans and cotton came from **Mexico**; tobacco, potatoes, and peanuts, from **South America**; clover, from **Europe**; sorghum, from **Africa**; Rice, cotton, alfalfa, and soybean from **Asia**; and hemp, from **Pacific Islands**.

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- Each ancient civilization based on particular crops, for example wheat has been mentioned that it was probably grown in the middle east as early as 10000-15000 B.C (before the birth of Jesus Christ).
- Very ancient Egyptian monument, carbonized kernels of wheat were found by American archaeologists, in the middle of this century, as 6000-7000 years old as Jarmo site in Iraqi Kurdistan Region.

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## Center of origin according to Vavilov



- 1- Centers of China-millet, broom corn, sugar cane, sesame.
- 2- India-rice, sorghum, cotton, Sudan grass, chickpea, mungbean, sugar cane
- 3- Middle of Asia-common wheat, rye, peas, lentil, fababean, flax, sunflower, safflower, kenaf, cotton.
- 4- Mediterranean-cereals, legumes, oat, clovers, lathyrus.
- 5- Ethiopia- barley, sorghum, millet, fababean, safflower, castor bean, coffee
- 6- South Mexico and Middle America-maize, cotton
- 7- Latin America (Southern America)- maize, cotton, tobacco

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## According To DeCandole



- 1- Center of China-rice, soybean, oat
- 2- India- soft wheat, Asian cotton
- 3- Africa and Southern Europe- sorghum, peas, barley, rye, oat, hardwheat, flax, forage, cowpea
- 4- America-maize, cotton, peanut, tobacco

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## Iraqi Kurdistan Region as Region of Some Crops



Archaeological remains of **barley** at Jarmo site near Chamchal, between Kurkuk and Sulaimania governorate about **6800 B.C.**

Also carbonized kernels of **wheat** were found by American archaeologists, in the middle of the century, at the Charmo site about **6000-7000** years old.

It appears extremely like that **chickpea** were domesticated in the Fertile Crescent **7000** years ago

Van der Maesen (1987) reported that chickpea denotes from earliest time (before **3000 B.C.**) as a staple food for minor importance in Mesopotamia

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## **Iraq Topography and Environment Its Influence on Field Crops Distribution**

- Iraq occupies an area of about 444,442 km<sup>2</sup> (about 181 millions Donums) (latitudes 29°5' to 37°15' north and longitudes 38°45' to 48°45' east).
- The area under cultivation about 48 million Donums, among this about 16 millions located under rain-fed zone at North eastern equal or above 400 mm annual rainfall, while the remainder area which is comprise 32 millions Donums located under irrigated land.

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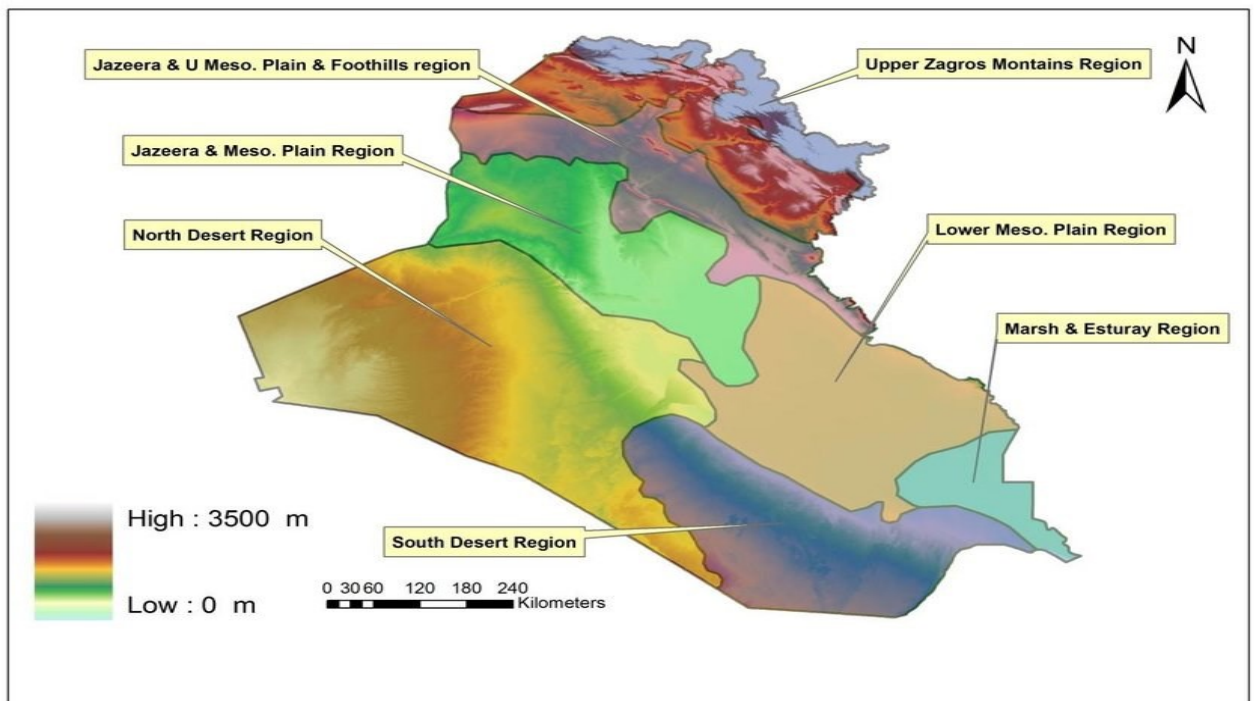
## **Four geographical regions can be recognized in Iraqi topography.**



- 1- Iraqi Kurdistan Region (The mountainous region)
- 2- Upper Mesopotamia Plains and foothills Region
- 3- Lower Mesopotamia plains (Central part of the country near Baghdad and Babylon)
- 4- The Southwestern Desert Region



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## Iraq climate



- The climate of Iraq in general is long and hot in summer season, and dry short in winter.
- With generally monthly mean temperature above **zero**.
- The mean annual air temperature in the north is about 20°C, increasing up to 25°C in the south and southwest.
- Minimum temperatures occur in January, and fall in the north to -12°C.
- By contrast maximum temperatures occur in July and range between **47°C** in the north and **52°C** in the south.

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- Roughly 90% of the annual rainfall occurs between November and April and most of that occurs between **December and March**.
- The remaining six months particularly June to August are **dry**.
- Precipitation is highest in northeastern highlands, which receives annually 760 to 1000 mm (30-40 inches) of rainfall and snow up to three months per year in some places.

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## **Factors Affecting Crop Growth and Distribution**

The principal factors that influence localization are climate, topography, character of soil, insect pests, plant diseases and economic conditions.

### **Climate**

Climate is the dominant factor in determining the suitability of a crop for a given area

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## Temperature



- Temperature is an important factor in limiting the growing of certain crops. Temp. is influenced by **latitude and altitude**.
- Crops are different for **temperature requirements** during their life, and during the stages of life, (germination, seedling, vegetative growth or reproductive growth or anthesis and ripening stages).
- Temperatures influenced differently with each stage as there are three limits for each stage (**minimum, optimum and maximum**).

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## Effect of Temperature on Plants



- Each crop plant has its own approximate temp. range i.e. its minimum, optimum and maximum for growth.
- Most crop plants make their best development between **16-32°C**. They either cease growth or die when the temp. become either too low or too high.
- Most cool-weather crop plants cease growth at temp. of **32-38°C**, while annual crops are killed by low temp. that range from **-0°C** down to **-40°C**.
- The seeding of spring wheat begins when the normal daily temp. rises to about **3°C**, spring oats at **6°C**, corn **13°C** and cotton at **17°C**.

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## Day length (Photoperiod)

Response of a plant to day length for flowering; plants have been categorized according to their day length requirements as:

**Short day, Long day and neutral or intermediate day plants**, however, it is really the length of the night, or dark period that is the critical factor that influences flowering.

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**Long day** includes most of winter cereal crops, clovers, sugar beet and some varieties of rice.

Some **short day plants** such as cotton, tobacco, maize, sorghum, rice, millets some varieties of soybean and sunflower.

While the **intermediate plants** including broomcorn, faba bean, field bean, alfalfa, peanuts.

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# Water



Rainfall is recognized as the direct source of most of the water used by our crops. Rainfall may affect on different crops to different degrees and in different ways, depending on such factors as the total annual precipitation, the season of the year, the rate of fall, the ability of the soil to absorb it, the air humidity and temp.

The great cereal production areas are found in section receiving an annual precipitation of 20-40 inches.

