



Basic Terms for all subjects

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Plant physiology

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Lecture 1

1. Photosynthesis - the process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide (CO₂) and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a byproduct
2. Transpiration - the process where plants absorb water through the roots and then give off water vapor through pores in their leaves
3. Nutrients - a substance that provides nourishment essential for growth and the maintenance of life
4. Cotyledon - an embryonic leaf in seed-bearing plants, one or more of which are the first leaves to appear from a germinating seed
5. Monocots - any of various flowering plants, such as grasses, lilies, and palms, having a single cotyledon in the seed, and usually a combination of other characteristics, typically leaves with parallel veins, a lack of secondary growth, and flower parts in multiples of three
6. Dicots - any of various flowering plants that are not monocotyledons, having two cotyledons in the seed and usually flower parts in multiples of four or five, leaves with reticulate venation, pollen with three pores, and the capacity for secondary growth
7. Meristem - a region of plant tissue, found mainly at the growing tips of roots and shoots and in the cambium, consisting of actively dividing cells forming new tissue



8. Apoplast - Within a plant, the apoplast is the free diffusional space outside the plasma membrane. It is interrupted by the Casparian strip in roots, by air spaces between plant cells and by the plant cuticle (most outside layer of cells)
9. Symplast - a continuous network of interconnected plant cells
10. Surface tension - the tension of the surface film of a liquid caused by the attraction of the particles in the surface layer by the bulk of the liquid, which tends to minimize surface area
11. Capillarity - the tendency of a liquid in a capillary tube or absorbent material to rise or fall as a result of surface tension
12. Xylem - the vascular tissue in plants that conducts water and dissolved nutrients upward from the root and also helps to form the woody element in the stem
13. Phloem - the vascular tissue in plants that conducts sugars and other metabolic products downward from the leaves
14. Osmotic pressure - the pressure that would have to be applied to a pure solvent to prevent it from passing into a given solution by osmosis, often used to express the concentration of the solution

Lecture 2

1. Minerals - a solid inorganic substance of natural occurrence
2. Ions - an atom or molecule with a net electric charge due to the loss or gain of one or more electrons
3. Diffusion - the movement of atoms or molecules from an area of higher concentration to an area of lower concentration
4. Solutes - the minor component in a solution, dissolved in the solvent (the liquid in which a solute is dissolved to form a solution)



5. Passive transport - is the cellular process of moving molecules and other substances across membranes. Passive transport does not involve any chemical energy
6. Active transport - movement of ions or molecules across a cell membrane in the direction opposite that of diffusion, that is, from an area of lower concentration to one of higher concentration. Active transport requires energy
7. Deficiency - a lack or shortage
8. Fertilizer - a chemical or natural substance added to soil or land to increase its fertility
9. Rhizobium - a nitrogen-fixing bacterium that is common in the soil, especially in the root nodules of leguminous plants
10. Nitrogen fixation - the chemical processes by which atmospheric nitrogen is assimilated into organic compounds, especially by certain microorganisms as part of the nitrogen cycle
11. Rototilling - to till or plow (soil) with a rototiller (a motor-driven machine with rotating blades for breaking up or tilling the soil)
12. Pesticides - a substance used for destroying insects or other organisms harmful to cultivated plants or to animals
13. Herbicides - a substance that is toxic to plants and is used to destroy unwanted vegetation

lecture3

1. Chlorophyll - a green pigment, present in all green plants, responsible for the absorption of light to provide energy for photosynthesis
2. Pigments - the primary function of pigments in plants is photosynthesis, which uses the green pigment chlorophyll along with several red and yellow pigments that help to capture as much light energy as possible



3. Chloroplast - (in green plant cells) a plastid (any of a class of small organelles) that contains chlorophyll and in which photosynthesis takes place
4. NADPH – supply energy to different processes in the cell by giving the H⁺ (and then become NADP⁺). After giving the H⁺, it can be recycled (getting the H⁺ back).
Photosynthesis for example, create energy to recycle NADP⁺ back to NADPH
5. ATP - supplies energy for many biochemical cellular processes, by giving one P and becoming ADP
6. Carbohydrates - any of a large group of organic compounds occurring in foods and living tissues and including sugars
7. C₃ plants - are the most common and the most efficient at photosynthesis in cool, wet climates
8. C₄ plants - are most efficient at photosynthesis in hot, sunny climates
9. CAM plants - are adapted to avoid water loss during photosynthesis so they are best in deserts
10. Calvin cycle - is the set of chemical reactions that take place in chloroplasts during photosynthesis. The cycle is light-independent because it takes place after the energy has been captured from sunlight. In Calvin cycle sugars are formed from atmospheric CO₂
11. Respiration - convert the sugars (photosynthates) back into energy for growth and other life processes (metabolic processes). The chemical equation for respiration shows that the photosynthates are combined with oxygen releasing energy, carbon dioxide, and water
12. Bio fuel - type of energy derived from renewable plant and animal materials
13. Photoreceptor - are light-sensitive proteins involved in the sensing and response to light in a variety of organisms

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14. Photochromic - a blue-green pigment found in many plants, in which it regulates various developmental processes



Lecture 4

1. Hormones - a regulatory material produced in an organism and transported in tissue fluids such as blood or sap to stimulate specific cells or tissues into action
2. Germination - the process by which a plant grows from a seed
3. Dormancy - is defined as a state in which seeds are prevented from germinating even under environmental conditions normally favorable for germination. These conditions are a complex combination of water, light, temperature, gasses, mechanical restrictions, seed coats, and hormone structures
4. GFP - is a protein that exhibits bright green fluorescence when exposed to light in the blue to ultraviolet range
5. Male sterility - Inability of flowering plants to produce functional pollen
6. Basipetal movement - movement of material towards the basal region (downward) of the plant from the root and shoot apices
7. Apical dominance- is the phenomenon whereby the main, central stem of the plant is dominant over (i.e., grows more strongly than) other side stems; on a branch the main stem of the branch is further dominant over its own side branches
8. Embryo - the part of a seed which develops into a plant
9. Stress - Stresses can be abiotic, such as drought or excess light, or biotic, such as herbivores or pathogens
10. Signal transduction - a set of chemical reactions in a cell that occurs when a molecule, such as a hormone, attaches to a receptor on the cell membrane. The pathway is actually a cascade of biochemical reactions inside the cell that eventually reach the target molecule or reaction



Aquaculture

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Fish Farming Methods

1. Stationary Earthen fish ponds = Simple fish earthen ponds dug into the ground. Water is pumped only to fill the ponds as a compensation for seepage and evaporation.
2. "Smart Pond" Array = Sophisticated earthen-ponds array consisting on grow-out ponds and "lung ponds". Fish are only grown in the grow-out ponds, while effluent water slowly recirculates through the "lung ponds" for water purification.
3. Sheltered Sites = Marine or Lake sites where standard floating fish-cages may be installed.
4. Exposed Sites = Marine sites exposed to rough weather, high waves and strong winds where only especially fitted fish-cages may be installed.

Water Quality in earthen Ponds

1. Algae = Unicellular Algae which grow in fish-ponds, assimilating nutrients and minerals excreted by fish and Bacteria.
2. Heterotrophic Bacteria = Unicellular Bacteria which use dead organic material as carbon source, playing a significant role in purifying water in fish ponds.
3. Autotrophic Nitrifying Bacteria = Unicellular Bacteria which are capable of oxidizing Ammonia and Nitrite as a source for energy.
4. Ammonia = A major pollutant excreted by fish to pond water. Already low Ammonia concentrations affects fish negatively in pond water.
5. Nitrite = A significant pollutant in fish pond waters. Formed by oxidation of Ammonia by Nitrifying Bacteria in pond water. Nitrite must be further treated to avoid accumulation in pond waters.



6. Carbon Dioxide = CO₂ is excreted from fish gills to pond water, causing in reduction of pH values. This may eventually disturb fish growth in the ponds.
7. pH = A unit used to define Acidity of pond waters. Fish like to live within certain pH range. Out-of-range pH values in fish ponds may cause direct negative effect on fish and also interrupt Nitrification.
8. DO (Dissolved Oxygen) = This is a measuring unit used to define Oxygen levels in fish pond waters. Oxygen is a hard to dissolve gas in water. DO values are essential for fish as well as for most living organisms contributing to keep good water quality in fish ponds.

Fish Feeding

1. Total Biomass = The total mass of fish in a given pond. This is calculated by multiplying the number of fish in that pond, by their average weight.
2. FCR, (Food Conversion Rate) = Accumulative amount of food given to fish in a given pond, divided by the total biomass of fish harvested from that very pond. FCR value indicates farmer's success in farming the fish.
3. Economy of fish farming
4. Feasibility Study = The first step taken prior to establishment of a new fish farm. This is a preliminary study, evaluating if there are suitable conditions for fish farming in the chosen site.
5. Business Plan = This is the second step taken prior to establishment of a new fish farm. In this preliminary study, evaluation is done for the required Investment, production costs and sales of the fish. Based on Business Plan results – a decision is taken either to establish the new fish farm or not.
6. Pay Back Period = Economic parameter evaluating in how many years the required investment in the farm will be returned.
7. IRR = Internal Rate of Return = Economic parameter evaluating what will be the rate of returning the required investment.



8. NPV (Net Present Value) = Economic parameter evaluating the cumulative profit of a fish farm after certain number of years of operation (usually evaluated for 5 and 10 years ahead).
9. RAS systems (Recirculating Aquaculture Systems)
10. Suspended material = Materials suspended in fish system's water.
11. Dissolved material = Materials dissolved in fish system's water.
12. Settler = A device used to catch suspended material from fish system's water.
13. Screen Filter = A very fine screen material used to filter small suspended materials in fish system's water.
14. Biofilter = A special filtering device using Nitrifying Bacteria to purify fish system's water from Ammonia and Nitrite.
15. DFC = A device used to efficiently dissolve Oxygen into fish system's water. This is essential for systems holding high densities of fish in modern rearing systems.



Plant Breeding

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A. Introduction to genetics

1. Genetics- the study of genes, heredity, and genetic variation in living organisms. It is generally considered a field of biology.
2. Heredity- is the passing of traits from parents to their offspring, either through asexual reproduction or sexual reproduction. This is the process by which an offspring cell or organism acquires or becomes predisposed to the characteristics of its parent cell or organism.
3. Gene- is a locus (or region) of DNA that encodes a functional RNA or protein product, and is the molecular unit of heredity. The transmission of genes to an organism's offspring is the basis of the inheritance of phenotypic traits.
4. Genetic variation- is a fact that a biological system – individual and population – is different over space. It is the base of the Genetic variability of different biological systems in space. Genetic variation is based on the variation in alleles of genes in a gene pool. It occurs both within and among populations.
5. Genome- In modern molecular biology and genetics, the genome is the genetic material of an organism. It consists of DNA (or RNA in RNA viruses). The genome includes both the genes and the non-coding sequences of the DNA/RNA.
6. Trait- A phenotypic trait, or simply trait, is a distinct variant of a phenotypic characteristic of an organism; it may be either inherited or determined environmentally, but typically occurs as a combination of the two. For example, eye color is a character of an organism, while blue, brown and hazel are *traits*.
7. DNA- is a molecule that carries most of the genetic instructions used in the development, functioning and reproduction of all known living organisms and many viruses. DNA is a nucleic acid; alongside proteins and carbohydrates, nucleic acids compose the three major macromolecules essential for all known forms of life. Most DNA molecules consist of two



biopolymer strands coiled around each other to form a double helix. The two DNA strands are known as polynucleotides since they are composed of simpler units called nucleotides.

8. RNA- Ribonucleic acid (RNA) is a polymeric molecule implicated in various biological roles in coding, decoding, regulation, and expression of genes. RNA and DNA are nucleic acids, and, along with proteins and carbohydrates, constitute the three major macromolecules essential for all known forms of life.
9. Protein- are large biomolecules, or macromolecules, consisting of one or more long chains of amino acid residues. Proteins perform a vast array of functions within living organisms, including catalyzing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules from one location to another.
10. Evolution- is change in the heritable traits of biological populations over successive generations. Evolutionary processes give rise to diversity at every level of biological organization, including the levels of species, individual organisms, and molecules
11. Genotype- is that part (DNA sequence) of the genetic makeup of a cell, and therefore of an organism or individual, which determines a specific characteristic (phenotype) of that cell/organism/individual.
12. Allele- is one of a number of alternative forms of the same gene or same genetic locus. Sometimes, different alleles can result in different observable phenotypic traits, such as different pigmentation.
13. Ploidy- is the number of sets of chromosomes in a cell. Usually a gamete (sperm or egg, which fuses into a single cell during the fertilization phase of sexual reproduction) carries a full set of chromosomes that includes a single copy of each chromosome. The gametic or haploid number (n) is the number of chromosomes in a gamete. Two gametes form a diploid zygote with twice this number ($2n$, the zygotic or diploid number) i.e. two copies of autosomal chromosomes.

B. Plant genetics



14. Pollen tube- A pollen tube is part of the male gametophyte of seed plants. It acts as a conduit to transport the male gamete cells from the pollen grain, either from the stigma (in flowering plants) to the ovules at the base of the pistil, or directly through ovule tissue in some gymnosperms.
15. Anther- is the pollen-producing reproductive organ of a flower. A stamen typically consists of a stalk called the filament and an anther which contains microsporangia.
16. Filament- Part of a stamen, the male part of a flower
17. Stigma- The stigma is the receptive tip of a carpel, or of several fused carpels, in the gynoecium of a flower. The stigma receives pollen and it is on the stigma that the pollen grain germinates.
18. Style- The style connects the stigma to the ovary. Styles are generally tube-like either long or short. The style can be open (containing few or no cells in the central portion) or closed (densely packed with cells throughout). Pollen tubes grow the length of the style to reach the ovules, and in some cases self-incompatibility reactions in the style prevent full growth of the pollen tubes.
19. Ovule- is the structure that gives rise to and contains the female reproductive cells. It consists of three parts: The integument(s) forming its outer layer(s), the nucleus (or remnant of the mega sporangium), and female gametophyte (formed from haploid megaspore) in its center.
20. Ovary- is a part of the female reproductive organ of the flower or gynoecium. Specifically, it is the part of the pistil which holds the ovule(s) and is located above or below or at the point of connection with the base of the petals and sepals.
21. Petals- are modified leaves that surround the reproductive parts of flowers. They are often brightly colored or unusually shaped to attract pollinators.
22. Sepal- is a part of the flower of angiosperms (flowering plants). Usually green, sepals typically function as protection for the flower in bud, and often as support for the petals when in bloom.



23. Receptacle- is the thickened part of a stem from which the flower organs grow. In some accessory fruits, for example the pome and strawberry, the receptacle gives rise to the edible part of the fruit.
24. Pedicel- is a stem that attaches a single flower to the inflorescence. In the absence of a pedicel, the flowers are described as sessile.
25. Pollination- is a process in which pollen is transferred to the female reproductive organs of seed plants, thereby enabling fertilization and reproduction through growth of the pollen tube and eventual release of sperm.
26. Endosperm- is a tissue produced inside the seeds of most of the flowering plants around the time of fertilization. It surrounds the embryo and provides nutrition in the form of starch, though it can also contain oils and protein.
27. Eukaryote- is any organism whose cells contain a nucleus and other organelles enclosed within membranes. The defining feature that sets eukaryotic cells apart from prokaryotic cells (Bacteria and Archaea) is that they have membrane-bound organelles, especially the nucleus, which contains the genetic material, and is enclosed by the nuclear envelope.
28. Prokaryote- A prokaryote is a single-celled organism that lacks a membrane-bound nucleus (karyon), mitochondria, or any other membrane-bound organelle.
29. Chromosome- is a packaged and organized structure containing most of the DNA of a living organism. It is not usually found on its own, but rather is structured by being wrapped around protein complexes called nucleosomes, which consist of proteins called histones.
30. Plasmid- is a small DNA molecule within a cell that is physically separated from a chromosomal DNA and can replicate independently. They are most commonly found in bacteria as small, circular, double-stranded DNA molecules.
31. Centromere- is the part of a chromosome that links sister chromatids or a dyad. During mitosis, spindle fibers attach to the centromere via the kinetochore.



32. Telomere- is a region of repetitive nucleotide sequences at each end of a chromosome, which protects the end of the chromosome from deterioration or from fusion with neighboring chromosomes.
33. Histones- are highly alkaline proteins found in eukaryotic cell nuclei that package and order the DNA into structural units called nucleosomes. They are the chief protein components of chromatin, acting as spools around which DNA winds, and playing a role in gene regulation. Without histones, the unwound DNA in chromosomes would be very long.
34. Chromatid- is one copy of a newly copied chromosome which is still joined to the other copy by a single centromere. Before replication, one chromosome is composed of one DNA molecule. Following replication, each chromosome is composed of two DNA molecules
35. Meiosis- is a specialized type of cell division that reduces the chromosome number by half. This process occurs in all sexually reproducing single-celled and multicellular eukaryotes, including animals, plants, and fungi.
36. Mitosis- is a part of the cell cycle in which chromosomes in a cell nucleus are separated into two identical sets of chromosomes, and each set ends up in its own nucleus. In general, mitosis (division of the nucleus) is often accompanied or followed by cytokinesis, which divides the cytoplasm, organelles and cell membrane into two new cells containing roughly equal shares of these cellular components.
37. Autosome- is a chromosome that is not an allosome (a sex chromosome). Autosomes appear in pairs whose members have the same form but differ from other pairs in a diploid cell, whereas members of an allosome pair may differ from one another and thereby determine sex.
38. Prokaryotic fission- which is binary fission is a form of asexual reproduction and cell division used by all prokaryotes (bacteria and archaeobacteria) and some organelles within eukaryotic organisms (e.g., mitochondria). This process results in the reproduction of a living prokaryotic cell (or organelle) by dividing into two parts that each have the potential to grow to the size of the original cell.



C. Molecular biology and genetic engineering

39. Proteins- are large biomolecules, or macromolecules, consisting of one or more long chains of amino acid residues. Proteins perform a vast array of functions within living organisms, including catalyzing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules from one location to another.
40. Enzymes- are macromolecular biological catalysts. Enzymes accelerate, or catalyze, chemical reactions. The molecules at the beginning of the process are called substrates and the enzyme converts these into different molecules, called products.
41. Transcription- is the first step of gene expression, in which a particular segment of DNA is copied into RNA (mRNA) by the enzyme RNA polymerase.
42. RNA polymerase- (RNAP or RNAPol), also known as DNA-dependent RNA polymerase, is an enzyme that produces primary transcript RNA. In cells, RNAP is necessary for constructing RNA chains using DNA genes as templates, a process called transcription.
43. Translation- is the process in which cellular ribosomes create proteins. In translation, messenger RNA (mRNA)—produced by transcription from DNA—is decoded by a ribosome to produce a specific amino acid chain, or polypeptide. The polypeptide later folds into an active protein and performs its functions in the cell.
44. Ribosome- is a complex molecular machine found within all living cells, that serves as the site of biological protein synthesis (translation). Ribosomes link amino acids together in the order specified by messenger RNA (mRNA) molecules. Ribosomes consist of two major components: the small ribosomal subunit, which reads the RNA, and the large subunit, which joins amino acids to form a polypeptide chain. Each subunit is composed of one or more ribosomal RNA (rRNA) molecules and a variety of proteins.
45. Messenger RNA (mRNA) - is a large family of RNA molecules that convey genetic information from DNA to the ribosome, where they specify the amino acid sequence of the protein products of gene expression.



46. Transfer RNA- (tRNA or sRNA, for soluble RNA) is an adaptor molecule composed of RNA, typically 76 to 90 nucleotides in length that serves as the physical link between the mRNA and the amino acid sequence of proteins. It does this by carrying an amino acid to the protein synthetic machinery of a cell (ribosome) as directed by a three-nucleotide sequence (codon) in a messenger RNA (mRNA).
47. Genetic code- is the set of rules by which information encoded within genetic material (DNA or mRNA sequences) is translated into proteins by living cells. Biological decoding is accomplished by the ribosome, which links amino acids in an order specified by mRNA, using transfer RNA (tRNA) molecules to carry amino acids and to read the mRNA three nucleotides at a time.
48. Genetic engineering- also called genetic modification (GM), is the direct manipulation of an organism's genome using biotechnology. It is a set of technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms.
49. Restriction enzyme or restriction endonuclease is an enzyme that cuts DNA at or near specific recognition nucleotide sequences known as restriction sites. Restriction enzymes are commonly classified into three types, which differ in their structure and whether they cut their DNA substrate at their recognition site, or if the recognition and cleavage sites are separate from one another.
50. Ligase- is an enzyme that can catalyze the joining of two large molecules by forming a new chemical bond.
51. Gel electrophoresis- is a method for separation and analysis of macromolecules (DNA, RNA and proteins) and their fragments, based on their size and charge.
52. Polymerase chain reaction (PCR)- is a technology in molecular biology used to amplify a single copy or a few copies of a piece of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence.



53. Agrobacterium- is a genus of Gram-negative bacteria established by H. J. Conn that uses horizontal gene transfer to cause tumors in plants. Agrobacterium tumefaciens is the most commonly studied species in this genus. Agrobacterium is well known for its ability to transfer DNA between itself and plants, and for this reason it has become an important tool for genetic engineering.
54. Gene gun- or a biolistic particle delivery system, originally designed for plant transformation, is a device for injecting cells with genetic information; the inserted genetic materials are termed transgenes. The payload is an elemental particle of a heavy metal coated with plasmid DNA. This technique is often simply referred to as bioballistics or biolistics.

D. Breeding

55. Selection- generally refers to the pressures on cells and organisms to evolve. These pressures include natural selection, and, in eukaryotic cells that reproduce sexually, sexual selection. Certain phenotypic traits (characteristics of an organism)—or, on a genetic level, alleles of genes—segregate within a population, where individuals with adaptive advantages or traits tend to succeed more than their peers when they reproduce, and so contribute more offspring to the succeeding generation.
56. Hybrid- generally refers to any offspring resulting from the breeding of two genetically distinct individuals, which usually will result in a high degree of heterozygosity, though hybrid and heterozygous are not, strictly speaking, synonymous. a genetic hybrid carries two different alleles of the same gene.
57. Heterosis- hybrid vigor, or outbreeding enhancement, is the improved or increased function of any biological quality in a hybrid offspring. The adjective derived from heterosis is heterotic.
58. F1 hybrid- is the first filial generation of offspring of distinctly different parental types. F1 hybrids are used in genetics, and in selective breeding, where it may appear as F1 crossbreed. The term is sometimes written with a subscript, as F_1 hybrid.

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Methods in modern horticulture

Michal Amichai, MSc Desert studies

1. Phytoalexins - Chemicals produced by the plant and used as "chemical protection" from different kind of pests
2. Lateral Buds – Side branches -"Suckers": Branches that is coming out from buds located between the stem and a leaf. The side branches have an Apical bud, leafs and flowers, just like the stem.
3. Compound leaf – A true Leaf that if build from many "leaf-lets".
4. Tap Root – It`s a root build from one big and main root (the taproot), Which all the small roots is going out from it.
5. Apical Bud – This is the bud on the shoot tip, the upper part of the plant. The tissiue of the apical bud creates all the organs along the stem
6. Inflorescence – A "vine" of flowers. Many flowers that is blooming at a similar period and located on the same "floor"
7. Pollination – The time that the pollen of the male part of the flower if being transferred to the female part, the stigma.
8. Cultivar - it is a plant or grouping of plants selected for desirable characteristics that can be maintained by propagation
9. Determinate growth plant - Determinate Types bear a full crop all at once and top off at a specific height, normally plant will end it`s grows when the apical bud turn into one or two Inflorescence.
10. Indeterminate Growth Plant – Will continue to grow "endlessly", the apical bud of the main stem will always an apical bud.
11. Soil Sanitation- The soil should be sanities from diseases, herbs seeds and nematodes. We have main 3 ways to do it: 1. Chemical sanitation (Transferring chemical to the soil usually with the



irrigation system) 2. Physical Sanitation (Steam directly to the soil. 3. Solar/Thermal Sanitation – Using the sun heat and radiation.

12. Tensiometer – A mechanical device that simulates the way the roots behave inside the soil. The Tensiometer operates under pressure in order to absorb water inside the pipe, and by measuring the pressure we can understand the amount of water inside the soil.

13. Suction Line tubing – A tube that with the help of an extractor (syringe) we can create sub pressure inside, and from the clay part, that is inside the wet soil, we can take a



New technologies in Agriculture

Or Shemer, MSc Agronomy

1. PAR – Photosynthetically active radiation
2. Glazing – Covering the building with transparent material
3. Surface water - water from above the ground (rain, river, melted ice), contains less salts.
4. Ground water - water from under the ground, contains
5. High salt level
6. PVC pipe-Polyvinyl carbonate, strong pipe, suitable for irrigation station
7. PE pipe- Polyethylene Flexible pipe, suitable for distribution and growing
8. One-way valve - Prevent water flow in the opposite direction to that desired
9. Hydraulic valve- can close water by water pressure from the computer
10. PRV- Pressure Reducing Valve- Allows to reduce the pressure after the pump.
11. Dosing unit- machine that push fertilization from fertilization tank to the water pipe
12. Nutrigation- add nutrients to agriculture plants
13. Chemigation- give chemicals throw the fertilization system
14. Dripper line- 16-20 mm pipe contains drippers for irrigation
15. Pressure Compensated (PC) Drippers- Drippers that take out water only at high pressure
16. Tensiometer- helps to detect the water level underground by pressure units
17. EC- (electric conductivity), helps to detect the salt concentration in the water solution.
18. GMO - Genetic Modified Crops
19. PCR - Polymerase Chain Reaction, allow to amplify DNA
20. Agrobacterium tumefactions- DNA manipulation bacteria for plants
21. Auxin – plant hormone cause to root development, cell division, light sensitivity and more
22. Cytokine – plant hormone cause to cell division



Organic Agriculture

Reut Shavit | Ph.D plant pathology

1. Sustainable agriculture - the act of farming using principles of ecology, the study of relationships between organisms and their environment
2. Organic farming: agriculture which works in harmony with nature rather than against it. This involves using techniques to achieve good crop yields without harming the natural Environment or the people who live and work in it.
3. Mineralization - Conversion from Organic Substance to Molecular Level Mineral
4. Cover crop – growing crops that helps Increasing nutrient availability and holding soil and nutrients in place.
5. Soil management –
6. A "healthy" soil is a key component of sustainability. 2. A healthy soil will produce healthy crop plants that have optimum vigor and are less susceptible to pests.
 - a. Inside soil there is a fragile and living medium that must be protected
 - b. Ensure its long-term productivity and stability
 - c. Limestone - a sedimentary rock, formed by inorganic remains, such as shells or skeletons that have compressed for a very long time. Using limestone for: increase soils PH, adding calcium, reduce level of toxicity of soils
7. Green manure - Growing and ploughing in the green crops into the soil. Green manures add nitrogen and organic matter to the soil for improving crop productivity.
8. Sanitation - measures to remove disease vectors, weed seeds, and habitat for pest organisms.
9. Reflective mulch - reflective aluminium mulches deter aphids from landing on plants. The effect is lost once plants are large enough to cover the mulch.
10. IPM - integrated pest management. A farmer must use management practices to prevent crop pests, weeds, and diseases.



Plant protection

Reut Shavit | Ph.D plant pathology

1. Abiotic factors are non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems in biology. Abiotic factors can include water, light, radiation, temperature, humidity, atmosphere, and soil.
2. Anthracnose and Canker generally refer to many different plant diseases of such broadly similar symptoms as the appearance of small areas of dead tissue, which grow slowly, often over years. Some are of only minor consequence, but others are ultimately lethal and therefore of major economic importance in agriculture.
3. Aphids, also known as plant lice or whiteflies, are small sap-sucking insects. Aphids are among the most destructive insect pests on cultivated plants in temperate regions.
4. Arthropod is an invertebrate animal having an exoskeleton (external skeleton), a segmented body, and jointed appendages. Arthropods form the phylum Arthropoda, and include the insects, arachnids, myriapods, and crustaceans.
5. Bacteria constitute a large domain of prokaryotic microorganisms. Typically a few micrometers in length, bacteria have a number of shapes, ranging from spheres to rods and spirals. Bacteria were among the first life forms to appear on Earth, and are present in most of its habitats.
6. Bacterial leaf scorch is a disease state affecting many crops, caused mainly by the xylem-plugging bacterium *Xylella fastidiosa*. It can be mistaken for ordinary leaf scorch caused by cultural practices such as over-fertilization.
7. Biological control is a bioeffector-method of controlling pests (including insects, mites, weeds and plant diseases) using other living organisms. It relies on predation, parasitism, herbivory, or other natural mechanisms.
8. Biotic factor is any living component that affects another organism, including animals that consume the organism in question, and the living food that the organism consumes. Each biotic



factor needs energy to do work and food for proper growth. Biotic factors include human influence.

9. Chlorosis is a condition in which leaves produce insufficient chlorophyll. As chlorophyll is responsible for the green color of leaves, chlorotic leaves are pale, yellow, or yellow-white. The affected plant has little or no ability to manufacture carbohydrates through photosynthesis and may die.
10. *Claviceps purpurea* is a fungus that grows on rye and related cereal and forage plants. Consumption of grains or seeds contaminated with the survival structure of this fungus, the sclerotium, can cause to ergotism disease in humans and other mammals.
11. Cucumber mosaic virus (CMV) is a plant pathogenic virus in the family Bromoviridae. This virus has a worldwide distribution and a very wide host range. It can be transmitted from plant to plant both mechanically by sap and by aphids in a stylet-borne fashion. It can also be transmitted in seeds and by the parasitic weeds.
12. Disease is a particular abnormal condition, a disorder of a structure or function that affects part or all of an organism. The causal study of disease is called pathology. Disease is often construed as a medical condition associated with specific symptoms and signs.
13. Disease is a particular abnormal condition, a disorder of a structure or function that affects part or all of an organism. The causal study of disease is called pathology. Disease is often construed as a medical condition associated with specific symptoms and signs. It may be caused by factors originally from an external source, such as infectious disease, or it may be caused by internal dysfunctions.
14. Entomology is the scientific study of insects, a branch of zoology, Include the study of terrestrial animals in other arthropod groups or other phyla, such as arachnids, myriapods, earthworms, land snails, and slugs.
15. Eukaryote is any organism whose cells contain a nucleus and other organelles enclosed within membranes.



16. Eukaryote is any organism whose cells contain a nucleus and other organelles enclosed within membranes.
17. Fungicides are chemical compounds or biological organisms used to kill or inhibit fungi or fungal spores. Fungi can cause serious damage in agriculture, resulting in critical losses of yield, quality, and profit.
18. Fungus is any member of the group of eukaryotic organisms that includes unicellular microorganisms such as yeasts and molds, as well as multicellular fungi that produce familiar fruiting forms known as mushrooms.
19. Fusarium is a large genus of filamentous fungi, part of a group often referred to as hyphomycetes, widely distributed in soil and associated with plants.
20. Galls are outgrowths on the surface of lifeforms. Plant galls are abnormal outgrowths of plant tissues. They can be caused by various parasites, from fungi and bacteria, to insects and mites.
21. Grafting is a horticultural technique whereby tissues from one plant are inserted into those of another so that the two sets of vascular tissues may join together. In most cases, one plant is selected for its roots and this is called the stock. The other plant is selected for its stems, leaves, flowers, or fruits and is called the scion. The scion contains the desired genes to be duplicated in future production by the stock/scion plant.
22. Gram staining is a method of staining used to differentiate bacterial species into two large groups Gram-positive and Gram-negative. The Gram stain is almost always the first step in the identification of a bacterial organism and it is a valuable diagnostic tool in both clinical and research settings. It differentiates bacteria by the chemical and physical properties of their cell walls by detecting peptidoglycan, which is present in a thick layer in Gram-positive bacteria. All the Gram-negative bacteria will be stained in a red or pink coloring. While Gram staining.
23. Greenhouse is a structure with walls and roof made chiefly of transparent material, such as polyethylene, in which plants requiring regulated climatic conditions are grown. These structures range in size from small sheds to industrial-sized buildings. The interior of a



greenhouse exposed to sunlight becomes significantly warmer than the external ambient temperature, protecting its contents in cold weather.

24. Herbicides are chemical substances used to control unwanted plants. Selective herbicides control specific weed species, while leaving the desired crop relatively unharmed.
25. Holometabolism, or complete metamorphosis, is where the insect changes in four stages, an egg or embryo, a larva, a pupa and the adult.
26. Honeydew is a sugar-rich sticky liquid, secreted by aphids as they feed on plant sap. When their mouthpart penetrates the phloem, the sugary, high-pressure liquid is forced out of the gut's terminal opening. Honeydew can cause to some fungal diseases.
27. Host is an organism that harbors a parasite, or a mutual or commensal symbiont, typically providing nourishment and shelter.
28. Hypha is a long, branching filamentous structure of a fungus. In most fungi, hyphae are the main mode of vegetative growth, and are collectively called a mycelium.
29. Infection is the invasion of an organism's body tissues by disease-causing agents, their multiplication, and the reaction of host tissues to these organisms and the toxins they produce.
30. Insecticide is a substance used to kill insects. Also used against insect eggs and larvae. Insecticides are used in agriculture, medicine, industry.
31. Insects are a class of invertebrates within the arthropod phylum that have a chitinous exoskeleton, a three-part body (head, thorax and abdomen), three pairs of jointed legs compound eyes and one pair of antennae.
32. Integrated pest management (IPM), is a broad-based approach that integrates practices for economic control of pests. IPM aims to suppress pest populations below the economic injury level.
33. Intracellular parasites are parasitic microorganisms - micro parasites that are capable of growing and reproducing only inside the cells of a host.



34. Leaf miner is the larva of an insect that lives in and eats the leaf tissue of plants. The vast majority of leaf-mining insects are moths and flies, though some beetles also exhibit this behavior.
35. Leaf scorch is defined as a browning of plant tissues, including leaf margins and tips, and yellowing or darkening of veins which may lead to eventual wilting and abscission of the leaf. Leaf scorch can be caused by soil compaction, transplant shock, nutrient deficiency, drought, salt toxicity, and herbicide injury.
36. Leaf spots are round marks found on the leaves of many species of plants, mostly caused by parasitic fungi or bacteria
37. Mandibles are typically the largest mouthpart of chewing insects, being used to masticate (cut, tear, crush, chew) food items. Chewing insects have two mandibles, one on each side of the head.
38. Metamorphosis in insects is the biological process of development all insects must undergo. There are two forms of metamorphosis: incomplete metamorphosis and complete metamorphosis.
39. Mites are small arthropods belonging to the subclass Acari and the class Arachnida. There are found in soil ecosystems and favored by high organic matter content and by moist conditions. A large number of species live as parasites on plants.
40. Mosaic viruses are plant viruses that cause the leaves to have a speckled appearance.
41. Nematodes or roundworms constitute the phylum Nematoda. They are a diverse animal phylum inhabiting a very broad range of environments. Nematode species can be difficult to distinguish, and although over 25,000 have been described, of which more than half are parasitic.
42. Organism is any contiguous living system, such as an animal, plant or bacterium. All known types of organisms are capable of some degree of response to stimuli, reproduction, growth and development and homeostasis.



43. Parasitic plant is one that derives some or all of its nutritional requirements from another living plant. All parasitic plants have modified roots, named haustoria which penetrate the host plants, connecting them to the conductive system - either the xylem, the phloem, or both. This provides them with the ability to extract water and nutrient from the hosts.
44. Pest is "a plant or animal detrimental to humans or human concerns (as agriculture or livestock production)" alternative meanings include organisms that cause nuisance and epidemic disease associated with high mortality.
45. phloem is the living tissue In vascular plants that carries organic nutrients ,in particular, sucrose, a sugar, to all parts of the plant where needed. The phloem is concerned mainly with the transport of soluble organic material made during photosynthesis. This process of transportation is called translocation.
46. Phytophthora infestans is a fungus that causes the serious potato disease known as late blight or potato blight.
47. Plant pathology also phytopathology is the scientific study of diseases in plants caused by pathogens (infectious organisms) and environmental conditions (physiological factors).
48. Plasmodesmata are microscopic channels which traverse the cell walls of plant cells and some algal cells, enabling transport and communication between them.
49. Powdery mildew is a fungal disease that affects a wide range of plants. Powdery mildew is one of the easier plant diseases to identify, as its symptoms are quite distinctive. Infected plants display white powdery spots on the leaves and stems.
50. Prokaryote is a single-celled organism that lacks a membrane-bound nucleus (karyon), mitochondria, or any other membrane-bound organelle.
51. Pythium is a genus of parasitic fungus. Most species are plant parasite. Pythium-induced root rot is a common crop disease. When the organism kills newly emerged or emerging seedlings it is known as damping off, and is a very common problem in fields and greenhouses.



52. Sap is a fluid transported in xylem cells or phloem of a plant. Xylem sap consists primarily of a watery solution of hormones, mineral elements and other nutrients. Transport of sap in xylem is characterized by movement from the roots toward the leaves.
53. Scab is a plant disease of root and tuber crops caused by a small number of *Streptomyces* species and others. Common scab mainly affects potato (*Solanum tuberosum*), but can also cause disease on radish, parsnip, beet and carrot.
54. Spore is a unit of asexual reproduction that may be adapted for dispersal and for survival, often for extended periods of time, in unfavorable conditions.
55. Tobacco mosaic virus (TMV) is a positive-sense single stranded RNA virus that infects a wide range of plants, especially tobacco and other members of the family Solanaceae. The infection causes characteristic patterns, such as "mosaic"-like mottling and discoloration on the leaves.
56. Tomato yellow leaf curl virus (TYLCV) is a DNA virus from the genus Begomovirus. TYLCV causes the most destructive disease of tomato, and it can be found in tropical and subtropical regions causing severe economic losses. This virus is transmitted by an insect vector from the order Hemiptera, the whitefly *Bemisia tabaci*, commonly known as the silverleaf whitefly or the sweet potato whitefly.
57. Vascular plants or higher plants form a large group of plants that are defined as those land plants that have lignified tissues (the xylem) for conducting water and minerals throughout the plant. They also have a specialized non-lignified tissue (the phloem) to conduct products of photosynthesis.
58. Virus is a small infectious agent that replicates only inside the living cells of other organisms. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria and archaea.
59. Virus virulence factors determine whether infection occurs and how severe the resulting viral disease symptoms are.
60. Weed is a plant considered undesirable in a particular situation, "a plant in the wrong place". Such as farm fields, gardens, lawns, and parks.



61. Xylem is one of the two types of transport tissue in vascular plants, phloem being the other. It is found throughout the plant. The basic function of xylem is to transport water, but it also transports some nutrients.



Post-Harvest

Maya Toren, MSc Agronomy

1. Postharvest handling - is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing.
2. Pathogens - A pathogen or infectious agent is a biological agent that causes disease or illness to its host.
3. Senescence - biological aging
4. Abscission - is the shedding of various parts of an organism, such as a plant dropping a leaf, fruit, flower, or seed.
5. Ethylene - (the aging hormone) is an important natural plant hormone, used in agriculture to force the ripening of fruits.
6. 1-MCP - a synthetic plant growth regulator. It is structurally related to the natural plant hormone ethylene and it is used commercially to slow down the ripening of fruit and to help maintain the freshness of cut flowers.
7. Climacteric fruits -Ethylene in these fruits acts as a trigger switching on an internal developmental program eventually bringing to the fruit self-destruction
8. Non-climacteric fruits - the ripening-related changes are more gradual and are not accompanied by sharp changes in respiration and ethylene production.
9. Quiescent (latent) diseases - Penetration occurs in the field, but rot does not develop until the fruit is ripe.
10. Fungicides - a chemical that destroys fungus.
11. Biological control -is a method of controlling pests and pathogens using other living organisms.
12. Respiration rate - The rate of physiological process
13. Chilling Injury- A damage caused to a produce by low positive temperature



Poultry Management

Ilan Arye, MSc Life Sciences

1. **Primary Breeders:** Primary breeding companies are large international enterprises with geneticists, nutritionists, veterinarians, and Computer specialists on their staffs. Today, there are only three major primary broiler breeding companies in the world
2. **Parent breeding flocks** are typically owned by commercial broiler companies. Eggs produced by parent flocks are transported to company-owned hatcheries. Chicks from these hatcheries are taken to commercial broiler
3. **Sexing:** The gender of day old chicks can be determined by feather sexing or vent Sexing. Feather sexing is based on the length of the primary and covert feathers on the wing. The top row of feathers is composed of the coverts and the bottom row of feathers is primary feathers. In females carrying fast feathering genes, coverts are always shorter than primaries. Males carry slow feathering genes, so covert feathers are always as long as primary feathers. Vent sexing involves examination of the cloacal wall to detect rudimentary male copulatory organs.
4. **Stocking Density:** Correct stocking density is necessary to obtain optimal broiler performance, uniformity, product quality, and meet welfare requirements. **P**
5. **Ventilation Systems:** Ventilation is the primary means for controlling the environment in a chicken house. There are two types of ventilation systems: natural ventilation used in open-sided housing and power ventilation used in controlled environment housing, commonly referred to as “tunnel ventilation”
6. **Natural ventilation:** requires continuous monitoring and adjustment of curtains in response to changes in temperature, humidity, wind velocity, and wind direction.
7. **Power ventilation systems:** provide more control over air exchange rates and air flow patterns, which allows flock Managers to create more uniform conditions within a house.
8. **Brooding :** occurs during the initial 14days of a broiler chicken’s life or until the chicks are feathered and able to maintain body temperature **Culling** remove sick chickens is important in



- preventing or limiting disease outbreaks. Growers should walk houses daily to check for sick and dead birds, record their number, and dispose of carcasses properly.
9. Carcass Disposal: Disposal of dead birds is regulated by local, state, and federal governments to control the impact of carcass disposal on air quality, water quality, and the spread of disease.
 10. Load-out: Catching broilers at night reduces the probability of scratches, fractured leg or wing bones, and suffocation from piling.
 11. Feed Withdrawal: Withholding feed from broiler chickens immediately prior to catching, loading, and transportation to a processing plant is a standard management practice. Objectives of feed withdrawal are to reduce fecal excretion and external cross-contamination during transportation and to reduce fecal contamination of poultry carcasses that may occur during automated evisceration in a processing plant
 12. Biosecurity: Biosecurity encompasses procedures that reduce the probability of disease outbreaks and includes two components: a) bioexclusion prior to an outbreak (keeping pathogens out) and b) biocontainment after an outbreak (keeping pathogens from leaving an infected flock to prevent disease transmission)..
 13. Livability: Percent of flock placed at hatch that is processed; opposite of mortality. $\text{Livability} + \text{mortality} = 100$
 14. Lux (lx): A standard measurement of light intensity, one lux is the amount of light cast by one lumen over a square meter; one foot candle equals 10.8 lx
 15. Ovum: Haploid female reproductive cell that develops from an oocyte after the second polar body is formed during meiosis; occurs in the infundibulum of the oviduct
 16. Photosensitive: Hen or tom responds to light stimulation by developing secondary sex characteristics or behavior and initiates production of eggs or spermatozoa
 17. Photo stimulation: Increasing the duration, intensity, and/or wavelength of light exposure to bring a flock into active reproduction
 18. Pipping: Internal: penetration of the beak through the shell membrane into the air cell; External: penetration of the beak through the shell in preparation for hatching



19. All-In-All-Out: Completely filling a room, building or site with chickens and then completely emptying it to allow for cleaning and disinfection before the next group of chickens arrives.
20. Ambient temperature: The air temperature maintained in an egg storage facility or a transport vehicle.
21. Battery Cages: “Battery” refers to a collection of cages.
22. Cleaning and Disinfection (C&D): Practices involving a combination of physical and chemical processes that kill or remove pathogenic microorganisms – a combination that is vital for the eradication of disease.
23. Cage Free: Chickens in cage-free systems are kept indoors but do not reside in cages and have access to communal nest boxes with automated egg collection, perches, and litter.
24. Detergent: Chemical products used to disperse and remove soil and organic materials from surfaces by reducing surface tension and increasing the penetrating ability of water. This can improve a disinfectant’s ability to reach and destroy microbes within or beneath the dirt. Some disinfectants (i.e., quaternary ammonium compounds) have detergent properties
25. Disinfectant: A substance used on inanimate surfaces that destroys or eliminates a specific species of infectious or other public health microorganism, but not necessarily bacterial spores, in the inanimate environment. Disinfectants are regulated by the U.S. Environmental Protection Agency (EPA). Disinfection can also be achieved by physical means (e.g., heat, light).
26. Flock: All laying hens within one chicken house.
27. Pullet: Immature female chickens prior to the onset of egg production.
28. Relative Humidity: Is a ratio, expressed in percent, of the amount of atmospheric moisture present relative to the amount that would be present if the air were saturated. Since the latter amount is dependent on temperature, relative humidity is a function of both moisture content and temperature.
29. Physiological Development of Pullets: It is critical that pullets have the correct body weight and correct body composition at the onset of lay so egg production and shell quality can be sustained during the production period



30. Flock Uniformity: Beginning at 4 weeks of age, 100 pullets should be weighed each week to monitor average body weights and uniformity. Uniformity is represented by the percentage of pullets within 10% of the average body weight of individuals within the flock. Uniformity at 16 weeks of age is an important indicator of pullet flock quality. Grow out programs strive to attain 85-90% body weight uniformity.
31. Lighting: The intensity and duration of light during brooding and grow-out directly impacts growth and onset of sexual maturity.
32. Enriched Colony Cages: Chickens in “enriched” or “furnished” cages have access to curtained nest boxes, perches, an abrasive strip to reduce excessive growth of claws, and an area for pecking, dust-bathing, and scratching. Dust pans are frequently placed on top of the nest boxes. Enriched colony cages house 40-60 hens and provide approximately 50% more space per hen than traditional cages.
33. Shell Egg Candling: Immediately following the egg wash, each egg is fully inspected via the candling process. Unclean eggs are Removed and sent back for rewash; cracked or rejected eggs are placed in the waste inedible egg system.



Soil, Water and Fertilizers

Talli Ilani | Ph.D. in Dryland Agriculture

Lecture 1

1. Soil - is a natural body of solids, liquid, and gases, soils have unique physical, chemical, and biological properties important to their agricultural use.
2. Ecosystem services – direct and indirect contributions of ecosystems to human well-being.
3. Soil components – soils are typically containing 25% air, 25% water and 50% solid material, the solid material is divided by organic (5%) and mineral (45%). In any soil sample the water status of a soil and soil texture affects the ratio between air and water
4. Soil profile – soil is heterogenic and there are changes in its chemical/ biological traits between top and deep soil.
5. Three fractions of mineral matter – soil mineral material is divided by its relative size (from big to small) sand, silt and clay.
6. Soil texture – is determined by the relative abundance of sand silt and clay in a soil sample
7. Clay- the smallest mineral fraction made mostly of aluminum, oxygen and silicon. Clays are responsible for the majority of cations sorption to clays. Soils rich with clays also tends to hold more water.
8. Silt – medium size fraction of the soil.
9. Sand – biggest size fraction of soil. High sand content allows high water conductivity in the soil profile.
10. Soil structure - The arrangement of primary soil particles into compound particles or aggregates
11. Soil aggregate - are groups of soil particles that bind to each other more strongly than to adjacent particles. The space between the aggregates provides pore space for retention and exchange of air and water.



12. Cation exchange capacity- the ability of soils to hold cations, usually correlates with soil clay content.
13. Organic matter – organic matter (OM) is the decomposed and partially decomposed remains of plants and animals in the soil. OM is also called humus is vital for soil health and nutrient supply.
14. Soil formation – the rate and nature of soils are depended on 5 factors – time, biota, bedrock, topography and climate.

Lecture 2:

1. Haber-Bosch process – conversation of unavailable atmospheric N₂ into chemical nitrogenous fertilizer, a process which demands a lot of energy.
2. Human population growth in the 20 century. – What caused the rise in human population in the 20 century ? – Industrial nitrogen fixation(Haber Bosch process), discovery of antibiotic and the green revolution.
3. Green revolution – discovery of semi-dwarf rice and wheat mutations, which are less affected by the plant growth hormone Gibberellin, these cultivars can be supplied with high level of nitrogen without collapsing. Very productive cultivars in terms of seed weight/ shoot weight (Harvest Index). Help abolish famine in India and worldwide.
4. Limiting factor for plant growth - Plant yield can be no greater than that level allowed by the growth factor present in the lowest amount relative to the optimum amount for that factor
5. Availability of minerals -the availability of nutrient essential for plants is limited by soil factors such as moisture level and soil pH.
6. Plants response to fertilization - yield is not 0 since soils have basic fertility, when additional fertilizer is no longer the limiting factor, any added fertilizer will not increase crop yield. The decline in the figure represents the effects of salinity and toxicity due to over-fertilization.



7. Types of chemical fertilizers – chemical fertilizers can be supplied in solid, liquid or gas phase. In modern agriculture practices application of fertilizer is combined with the irrigation via drippers.
8. Macronutrients and Micronutrients
9. Chemicals elements essential for plants to growth, develop and reproduce are divided into two main categories: macro nutrients, which plants consume in large amounts (nitrogen, potassium and phosphorus are the most common fertilizers) and micronutrients (copper, zinc boron manganese and more)
10. Nutrient sorption by roots – active and passive
11. Plants acquire most of the nutrients by the root system in two mechanisms
12. Active transport from the soil solution into the root cells, this process involved specialized proteins and demands energy from the plants Passive transport of nutrients with the mass flow of water from the soil into the root.
13. Root growth as affected by soil nutrients Root is not “Blind” to the nutrients in the soil, the forage the soil for nutrients and growth intensively in nutrient rich soil patches.
14. Nutrients deficiencies – Plant growth may easily be restricted by limitation of nutrients essential for growth and to complete a plants life cycle. May of symptoms related to nutrients deficiencies are easily seen on the leaf.
15. Source-Sink relations- Source tissues are net exporters of assimilates, while sinks are net consumers of assimilates
16. Biological nitrogen fixation –Fixation of atmospheric nitrogen into available forms, this process is mediated (mostly) by soil bacteria. The legume families are good example for plants that benefits from symbiotic life with soil bacteria (Rhizobium), in exchange for nitrogen; the plants supply the bacteria with products of photosynthesis (carbon).
17. Crop rotation: Crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. It helps in reducing soil erosion and increases soil



fertility and crop yield. Crop rotation gives various nutrients to the soil. A traditional element of crop rotation is the replenishment of nitrogen

18. Azolla- a small floating fern, bacteria that lives inside his leaves named Anabena have the ability to fix atmospheric nitrogen. Can use as to increase nitrogen supply in rice paddies.
19. Mycorrhizae: is a symbiotic association composed of a fungus and roots of a plants. The plants benefits from increase root surface for nutrient foraging and inchange the fungi benefits products of photosynthesis.
20. Algal bloom :An algal bloom is a rapid increase or accumulation in the population of algae (typically microscopic) in a water system, nitrogen and phosphorus runoffs from agricultural activity are main causes for this phenomenon.
21. Composting: Compost organic matter that has been decomposed and recycled as fertilizer and soil amendment. Compost is a key ingredient in organic farming. At the simplest level, the process of composting simply requires making a heap of wetted organic matter known as green waste (leaves, food waste) and waiting for the materials to break down into humus after a period of weeks or months.

Lecture 3-

1. Soil salinity – Soil salinity is the salt content in the soil; the process of increasing the salt content is known as salinization. Salts occur naturally within soils and water. Salination can be caused by natural processes such as mineral weathering, or by the gradual withdrawal of an ocean. It can also come about through artificial processes such as irrigation.
2. Effect of sodium on soil structure- Sodic soils are characterized by a disproportionately high concentration of sodium (Na) in their cation exchange complex. They are usually defined as containing an exchangeable sodium percentage greater than 15%. These soils tend to occur within arid to semiarid regions and are innately unstable, exhibiting poor physical and chemical properties, which impede water infiltration, water availability, and ultimately plant growth.



3. The effect of salinity on plant growth-Although the water is not held tighter to the soil in saline environments, the presence of salt in the water causes plants to exert more energy extracting water from the soil. Plants may also suffer from specific toxicity of some of ions, most common are chloride (Cl^-) or Sodium (Na^+)
4. Soil compaction: Soil compaction is associated with changes of several soil properties, such as increases in bulk density and soil strength, decrease in pores spaces, and destruction of aggregates.
5. Waterlogging: Waterlogging occurs when most or all of the macropores become filled with water rather than air. It occurs more easily in soils that have a greater proportion of microspores than macropores, because the macropores promote free drainage while the microspores tend to hold on to water.
6. Soil Erosion: Soil Erosion is one form of soil degradation . Soil erosion is a naturally occurring process on all land. The agents of soil erosion are water and wind, each contributing a significant amount of soil loss each year. Soil erosion may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing serious loss of topsoil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality and damaged drainage networks.
7. Soil acidity: Soil acidity is measured in pH units. Soil pH is a measure of the concentration of hydrogen ions in the soil solution. The lower the pH of soil, the greater the acidity. pH is measured on a logarithmic scale from 1 to 14, with 7 being neutral. A soil with a pH of 4 has 10 times more acid than a soil with a pH of 5 and 100 times more acid than a soil with a pH of 6.
8. Effects of soil acidity: Plant growth and most soil processes, including nutrient availability and microbial activity, are favored by a soil pH range of 5.5 – 8. Acid soil, particularly in the subsurface, will also restrict root access to water and nutrients.
9. Aluminum toxicity: When soil pH drops, aluminum becomes soluble. A small drop in pH can result in a large increase in soluble aluminum (figure 1). In this form, aluminum retards root growth, restricting access to water and nutrients (figure 2).



Poor crop and pasture growth, yield reduction and smaller grain size occur as a result of inadequate water and nutrition. The effects of aluminum toxicity on crops are usually most noticeable in seasons with a dry finish as plants have restricted access to stored subsoil water for grain filling.

10. Liming: Liming is the most economical method of ameliorating soil acidity. The amount of lime required will depend on the soil pH profile, lime quality, soil type, farming system and rainfall.

Lecture 4-

1. Soil Hydrological system: Soil surface – root zone (3-2 meters) soil water content is affected by climate and vegetation.
2. Boundary zone – gravitational water (few meter to 40-50 meter) no seasonal changes, water is moving towards groundwater
3. Saturated zone – aquifer – (coarse porous material) – water inside geological layer
4. Soil Water Content: Soil water content ranges from 5% to about 50%. Soil water content is greatly affected by soil texture.
5. Matrix potential Rule of thumb : Saturation – soil after “heavy” irrigation
6. Field capacity – soil water content 3 days after “heavy” irrigation : $\Psi_m = -0.3 \text{ atm}$
7. Wilting point, the point that plants cant uptake water : $\Psi_m = -15 \text{ atm}$
8. Capillarity: Water moves into capillary soil pores- due to adhesive and cohesive forces. Capillary suction of water by soils is also known as “matrix suction”
9. Soil water movement – Water movement in the soil is dictated by soil texture, e.g. at saturation sand will have high conductivity while clay will display low water conductivity
10. Soil drying causes decrease in water availability for plants: Lower soil water conductivity

Lower water availability: Water are hold more tightly by capillary forces (lower matrix p



Entrepreneurship

Boaz Dreyer, MSc Business

Chami Zemach, B.A

1. The entrepreneur A man or woman or a group of people who initiate a business idea and have a motivation and a knowledge to set a business based on the idea.
2. Business Plan A summary of how the entrepreneur intends to manage the activities necessary for the venture to succeed.
3. Business: The activity of providing goods and services involving financial and commercial and industrial aspects.
4. Cash Flow: The excess of cash revenues over cash outlays in a given period of time.
5. Financing: The act of funding the business activity – providing money for the business needs.
6. Market: An economic situation where the prices of products and services are given by the powers of supply and demand.
7. Marketing: The commercial processes involved in promoting the interest of a business.
8. Sales Agreements in which products or services are given by the seller to the buyer for a fixed price.



Safety in agriculture

Elisha Zurgil, MSc Agronomy

1. Brackish water irrigation: salty water irrigation.
2. Electric Conductivity / EC: Measure for soil and or irrigation water salinity
3. Drinking water: Healthy water for drinking for humans and animals
4. Reused water / recycled: Unhealthy water for drinking for humans and animals
5. Contaminated land / work place Unsafe due to exposure to chemicals.
6. Poison: Material with negative influence on one's health.
7. LD 50: Lethal Dose that kills 50% of tested lab creatures
8. Desert: Arid zone far away from any sea with extreme temps
9. Pest control agent: Chemical used to reduce / kill insects population
10. Weed control agent: Chemical used to reduce damage of undesired plants
11. Female trees: Trees that do not pollinate themselves . Like palm date
12. Male trees: Trees that only pollinate female trees and do not carry fruits .
13. Evergreen plants: Plants that carry green leaves all around the year.as olive trees/..
14. Wind breaker: Wall, fence or plants that reduce wind velocity in open field.
15. Greenhouse effect: Accumulating heat under glass plastic or in a locked car
16. International Safety Standards: Product minimal demands for safe use and storage
17. Safety officer: Person in charge of teaching and keeping work place safe.
18. Machine safety instructions Rules included in manual and labels on every machine
19. Forklift: Tractor made for lifting heavy loads indoor and out in field
20. PTO: Tractors turning connection for toed machines
21. Ear plugs / protectors: Sponge noise plugs or ear covers for lowering noise damage
22. Dezi bell units: International measure for noise of work place
23. **OSH**: OCUPATIONAL SAFTY and HEALTH
24. Causes of accidents: Classifying reasons of damage to health



25. Inhalation of toxic substances: Breathing poison
26. Domestic accidents: Damage to health caused at home activities
27. Plant safety officers: Teachers / supervisors of OSH in a factory / cold store.
28. Law-mandated safety training: Obligatory Classes teaching how to avoid harm on farm / work.
29. Fatal accidents: Damage that involves death of one or more persons.
30. Reduce risk: Make the lowest chance to get hurt
31. The risk of using a substance: Combination of the degree of exposure and the toxicity
32. Safety precautions necessary: Information about means to avoid harm.
33. Toxicity: The degree to which a substance is harmful or poisonous.
34. Ready-to-use format: Chemicals that do not require mixing or other preparation
35. Rodenticides: Chemicals that can control rats, mice, gophers.
36. Secondary poisoning: When birds / foxes, dogs die of eating poisoned rats
37. Hazard symbols: International pictures showing danger / risk on a lable
38. Safety equipment: gloves, goggles or face shields, ear muffs, rubber boots,
39. accident investigation: Best way to decrease accident frequency and severity



Introduction to Israel

Iris Barazani, MSs Geography

Lecture 1: Jewish History and Religion

1. Jewish belief – based on what is written in the bible: the creation of the world by God in 6 days, Abraham is led by God to the land of Israel from the area of Iraq, where his family lived; the sacrifice of Abraham's son Isaac was a test to see if Abraham, is loyal to God; Jews go to the land of Egypt seeking for food and live there for a long time until they became a big community; Jews becoming slaves in Egypt by one of the Egyptian kings; Moses becomes the leader of Jewish people in Egypt and with the help of God helps them to run away from Egypt through Sinai desert, back to the land of Israel.
2. 10 commandments – were given by God to the people of Israel while walking in the desert for 40 years. The 10 commandments that every Jew should do or not do (not kill, not pray to other gods and more). The 10 commandments were put in an Ark of the Covenant that was carried by the Jews where ever they went, and later on were put in the Temple.
3. Jews entering the land of Israel as 12 tribes. Jews wishing to have a king, such as king David or Salomon. King Solomon builds a house for God. A house that is known as The Temple. The Temple was built in Jerusalem, and was considered to be the house of God. At that time Jews worship God by sacrificing animals on a shrine to God as a gift and as a way to ask for health, wealth and more.
4. During that time which is known as the Temple Time (there were 2 temples 900 BC.-586 BC. And from 538 BC-70 AD), many empires ruled the land of Israel and other places creating big empires: Greek Empire, Roman Empire and more.
5. During the Greek regime Jews revolt against the Greeks and won, but years later when Roman ruled Israel, Jews tried to revolt once again and failed, leaving the 2nd temple destroyed by the Romans. Since the year 70 AD Jews have no temple. Jews spread in the world and were for 2000 years in exile. Away from Israel, their home land in closed communities trying to live as a



different minority among other nations and religions. This way of life made them dependent on the local regime. In some places Jews suffered greatly because being different, being Jewish and as years went by especially in Europe during 19th century and on an Anti-Semite movements where blaming the Jews of taking control over the world. This anti-Semite movement became very strong during 1933 when Hitler became the prime minister of Germany. World war 2 happened between 1939-1945. During that time 6 million Jews were killed in different ways by the Germans. This time is known also as the Holocaust.

Lecture 2: The pioneers, the establishment of Israel and the Israeli-Palestinian Conflict

1. Nationalism – a new phenomenon in Europe during the 19 century, where people felt that they are part of a nation by their history, language, religion and territory. Nationalism created nations wanting to have their own independent country and regime.
2. Zionism – this is the name for the Jewish national movement that started in Europe by the end of the 19th century.
3. Arabs – a nation originally from Saudi Arabia, where the Muslim religion was born (by Muhammad the prophet) and from there was spread in the world. There are Muslim Arabs, but also Christian Arabs.
4. British mandate – British regime in the land of Israel/Palestine between 1920-1948.
5. Palestinians – Arabs who see themselves originally from Palestine (the land of Israel).
6. Israeli-Palestinian conflict – is a territorial conflict over land and power over Israel/Palestine between two nations (Jews and Palestinians).
7. 1948 – The declaration of Israel as a state.
8. United Nations – an international worldwide organization that was created after World War 2 in order to prevent any other wars and the killing of innocent people etc.

Lecture 3: The Israeli Society

1. Diaspora – these are all the places Jews live outside of Israel.



2. Returning from the Diaspora – a quick immigration of Jews from the Diaspora to Israel after Israel was declared as a state in May 14th 1948.
3. Jews came from: Yemen, Iraq, Iran, North Africa (Morocco, Egypt etc.), Europe and other places.
4. Religious Jews- these are Jews that follow all the laws of the religion. They can be divided into two main groups: Ultra-Orthodox and national Orthodox (national religious).
5. Religious-and non-religious conflict between the Jews is dealing with the "right" way to live as a Jew in public and private places, and regarding army service and attitude towards the state of Israel.
6. Israeli High Technology and Low Technology – Israeli inventions.
7. Citizenship – being part of a political state with duties and rights.

Lecture 4: Israel landscapes

1. Types of tourism: religious, health, political, historical and more brings over 2 million tourists to Israel in days of peace.
2. Tectonic movements – a global phenomenon: a long term earth quake causes movements of continents.
3. World types of climate – Israel has 2 kinds of climate: desert and Mediterranean.
4. Local desert and world desert line – two types of deserts in Israel.
5. Desalination of water: one of the ways to handle the lack of water in Israel.



Introduction to Israel

Boaz Dreyer, MSs Business

1. Aliyah Immigration of Jews to Israel
2. Altitude: Elevation or height especially above sea level or above the earth's surface.
3. Arabs A member of a Semitic people originally from the Arabian Peninsula and surrounding territories who speaks Arabic and who inhabits much of the Middle East and northern Africa.
4. Ashkenazi: Of or relating to Jews of German and Eastern Europe origin, and their traditions, customs, and rituals.
5. Assyria: An ancient kingdom in northern Mesopotamia which is in present-day Iraq.
6. Attrition: A wearing down to weaken or destroy.
7. Babylon: Capital of Babylonia in the 2nd and 1st century BCE.
8. BCE: Before the Common Era – BC in Christian calendar
9. Be'er Sheva: Capital City of the Negev – City of peace treaties
10. Byzantine: A continuation of the Roman Empire in the Middle East after its division in 395 CE
11. CE: Common Era – same as Christian AD Christianity: The religion originating from 1st century Judaism believing in Jesus Christ
12. Chuppah: The canopy over a Jewish couple during their marriage ceremony.
13. Climate: The weather in some location averaged over some long period of time.
14. Crusaders: A Christian warrior who engages in a holy war.
15. Demography: The branch of sociology that studies the characteristics of human populations
16. Druze: An adherent of an esoteric monotheistic religious sect living in the relative security of the mountains of Syria and Lebanon and Israel who believes that Al-hakim was an incarnation of God.
17. Erosion: The condition in which the earth's surface is worn away by the action of water and wind



18. Etzel: The National army of Israel. It was an offshoot of the older and larger Jewish paramilitary organization The Haganah.
19. Exodus: The departure of the Israelites out of slavery in Egypt led by Moses.
20. Fertile: Marked by great fruitfulness.
21. Floods: A rising of a body of water and its overflowing onto normally dry land.
22. Geography: The study of the earth's surface; includes people's responses to topography and climate and soil and Vegetation.
23. Hasmoneans: The Hasmonean dynasty was a Roman the ruling dynasty of Judea and surrounding regions during Classical antiquity. Between 140 and 116 BCE, the dynasty ruled semi-autonomously from the Seleucids in the region of Judea.
24. Hellenist: A person who adopted the Greek customs, language and culture during the Hellenistic period, especially a Hellenized Jew.
25. Histadrut: The Israeli national union of workers.
26. Hitler: Adolf Hitler – the leader of Nazi Germany
27. Holocaust: The attempted mass extermination of the Jewish people by the Nazis of Germany during the Second World War.
28. Intifada: The uprising by Arabs in both the Gaza Strip and the West Bank against Israel in the late 1980s and again in 2000
Islam The monotheistic religions system of Muslims founded in Arabia in the 7th century and based on the teachings of Muhammad as laid down in the Koran
29. Jerusalem: The united, eternal and indivisible Capital city of Israel meaning 'to see peace'. The hope of all Israelis
30. Judaism : The monotheistic religion of the Jews having its spiritual and ethical principles embodied chiefly in the Torah and in the Talmud.
31. Kibbutz: A collective farm or settlement owned by its members in modern Israel; children used to reared collectively. The modern kibbutz is undergoing many reforms in Management and remuneration.
32. Knesset: The Israeli parliament, located in Jerusalem.



33. Latitude: An imaginary line around the Earth parallel to the equator.
34. Lehi: Commonly referred to in English as the Stern Gang, was a Zionist paramilitary organization founded by Avraham ("Yair") Stern during the British Mandatory period.
35. Machpelah : The Cave of Machpelah is one of the holiest places in Judaism as it is the final resting place for all the patriarchs and the matriarchs with the exception of Rachel.
36. Mamluk: Egyptian rulers in the ancient Middle East
37. Mishnah: the first part of the Talmud; a collection of early oral interpretations of the scriptures that was compiled about CE 200
38. Moshav: A cooperative Israeli village or settlement comprised of small individually owned farms.
39. Nazi: Acronym for the National Socialist Party of Germany headed by Adolf Hitler.
40. Ottomans: The Turkish dynasty that ruled the Ottoman Empire from the 13th century to its dissolution after World War I
41. Palestine: The name given to Israel by the Romans to detract from the original name. This was reintroduced by the British during their mandate from 1917 to 1948.
42. Palestinian: The identity adopted by the Arab people living in Israel. There is no State of Palestine and by the behavior of their leaders prefer the support of European NGOs to independence.
43. Palmach: The Palmach, acronym for *Plugot Maḥatz*, literally 'strike forces' was the elite fighting force of the Haganah, the underground army of the Jewish community during the period of the British Mandate. The Palmach was established on 15 May 1941.
44. Persian: The people of Persia – Iran as it is known today.
45. Pesach : A Jewish festival (traditionally 8 days from Nissan 15) celebrating the exodus of the Israelites from Egypt.
46. Politics : The activities and affairs involved in managing a state or a government.
47. Religion: A strong belief in a supernatural power or powers that control human destiny
48. Romans: The ruling power in Israel from 63 BCE until 313 CE Rosh Hashanah The Jewish New Year.



49. Sephardic: A Jew who is of Spanish or Portuguese or North African descent.
50. Shekel: The basic unit of money in Israel originating from a unit of weight used in the Temple
51. Shulchan Aruch: The final codification of the Jewish oral law written by Joseph Caro in 1564 CE.
52. Tanach: The collection of the writings that comprise the Jewish Bible containing the Torah, the writings of the Prophets and historical writings.
53. Torah: The five books of Moses given to the Jewish people at Mount Sinai and the basis for all Jewish law and ethics.
54. Yom Kippur: The Day of Atonement, the holiest day in the Jewish calendar.



Agricultural Accounting for beginners

Becky vider, Certified tax consultant

1. Business income – income from selling a product or from giving a service
2. Business expense – Money spent to buy a product or service that is used to create income
3. Regular expense – Expenses for the ongoing operation of the business
4. Fixed Asset – A product bought with the intent of using it in the business over several years
5. Production Expenses – All costs necessary to bring the product to the state that it is ready for sale
6. Operation Expenses – All costs related to the operation of the business, just to maintain its existence
7. General & Administrative Expenses (G&A) - All costs related to the day to day operation of the business
8. Gross profit/loss – Net income minus production expenses
9. Net profit/loss – Gross profit minus operation expenses minus G&A expenses
10. Net profit/loss – Net income minus all the expenses
11. Depreciation – percent (%) of the money spent on purchasing a fixed asset, that is considered an expense for calculating the net profit/loss



Advanced computer skills:

Jessica Pearlman, B.A

1. Computer: an electronic device for storing and processing data (such as a pc, laptop, smartphone etc)
2. Hardware: is the collection of physical elements that constitutes a computer system. Computer hardware is the physical parts or components of a computer, such as the monitor, mouse, and keyboard
3. Software: Computer software also called a program is any set of instructions that directs a computer to perform specific tasks or operations
4. Operating System (OS): system software that manages computer hardware and software resources and provides common services for computer programs
5. Windows: a computer operating system with a graphical user interface created by
6. Microsoft. Windows eliminates the need to memorize commands. since its release, there have been over a dozen versions of Windows. The most current version of Windows for end users is Windows 10.
7. Control Panel: The Control Panel is a part of the Microsoft Windows graphical user interface which allows users to view and manipulate basic system settings and controls, such as adding hardware, adding and removing software, controlling user accounts, and changing accessibility options
8. Backup: the procedure for making extra copies of data in case the original is lost or damaged.
9. Online backup services: Online backup, also known as remote backup, is a method of data storage in which files, folders, or the entire contents of a hard drive are regularly backed up on a remote server or computer with a network connection.
10. Internet: The Internet is the global system of interconnected mainframe, personal, and wireless computer networks



11. Web Browser: A web browser (commonly referred to as a browser) is a software application for retrieving and presenting information resources on the World Wide Web.
12. Web Address (URL): The location on the Internet of a certain company, server, or file. URL is an acronym for “Uniform Resource Locator” and is a reference (an address) to a resource on the Internet.
13. Folder: a virtual container within a digital file system, in which groups of files and other folders can be kept and organized
14. Social Networks: a network of social interactions and personal relationships. A dedicated website or other application that enables users to communicate with each other by posting information, comments, messages, images, etc.
15. Microsoft office Word: A word processing program for Windows and Mac OS X from Microsoft. Word contains desktop publishing capabilities and is the most widely used word processing program on the market.
16. Document: a piece of written, printed, or electronic matter that provides information or evidence or that serves as an official record.
17. CV: A CV is the most flexible and convenient way to make Job/school applications. It conveys your personal details in the way that presents you in the best possible light.
18. Microsoft office Power point PowerPoint is a slide show presentation program by Microsoft. PowerPoint is useful for helping develop the slide-based presentation format, and is currently one of the most commonly-used presentation programs available.
19. A theme: A theme is a combination of one or more slide layouts with coordinating theme colors, a matching background, theme fonts, and theme effects. Theme colors, fonts, and effects not only work in PowerPoint, but they are also available in Excel, Word, and Outlook.
20. Topic Report: an exploratory work carried out by students, in a presentation format. The work is done by small groups of students, during which students collect data on the farms and explore an economic/agricultural/comparative issue regarding to their farm. In this process, the



students apply the theoretical material learned in the classroom with practical training they acquired.

21. Slideshow: a presentation supplemented by or based on a series of projected images or photographic slides.
22. Microsoft office Excel: a spreadsheet developed by Microsoft for Windows, Mac OS X, and iOS. It features calculation, graphing tools, pivot tables and more. Excel forms part of Microsoft Office.
23. Workbook: A Microsoft Office Excel workbook is a file that contains one or more worksheets that you can use to organize various kinds of related information.
24. Worksheet: an Excel worksheet is a single spreadsheet that contains cells organized by rows and columns. A worksheet begins with row number one and column A. Each cell can contain a number, text or formula
25. Formula: A formula is an expression which calculates the value of a cell.
26. Functions: predefined formulas and are already available in Excel.