



## Climate Strategy File for Damascus University

This file is prepared by office of the Sustainable Development in Damascus University. The climate strategy document for Damascus University contains the basic procedures which Damascus university applied for mitigating the climate crisis.

The climate strategy document for Damascus University includes five sections, starting from introduction to the main procedures which Damascus University applied to more explanations about those procedures.

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## **1-Introduction**

Achieving an effective sustainable developmental policy is considered a primary goal in a large number of institutions around the world. The application of this policy in universities is reflected throughout the country, especially in developing and low-income countries. One of the most significant things of reaching the sustainable development goals is the mitigation of the climate crisis over the world. This mitigation has its reflections on multiple sustainable development goals which, of course, reflected on the environmental output. Damascus University which is the largest university in the Syrian Arab Republic believes that the commitment to mitigate climate crisis is one of its responsibilities. Therefore, Damascus University has taken a number of measures to mitigate the climate crisis and contribute to creating a clean environment around the world. Damascus University has been increasing the green space in all branches of the university. It is worth noting that the most prominent indicators of sustainable development applied by the University of Damascus in accordance with the United Nations Agenda for Sustainable Development 2030 is the green area, which reached 63% of the total area of the university, which constitutes 40% of the total green area of Damascus Governorate, in addition to the amount of carbon gas emissions per minute 5793 kilograms of CO<sub>2</sub> equivalent. We include more information about the green areas in Damascus University in the second section of this file, in addition to

talking about the botanic garden which the university of Damascus built in the faculty of Agriculture for the limiting of the chemical drugs for the agriculture and increasing care for some rare species of medicinal plants.

Among the procedures applied by the University of Damascus also in order to commit to mitigating the climate crisis is the reduction of the consumption of electric energy that relies on fuel for its generation, and its replacement with alternatives that rely on renewable and clean energies, especially solar energy. In this context, the university of Damascus signed an agreement in 2018 with the Energy Research Center in the Syrian Arab Republic to install a number of solar energy cell panels with high electrical power in a number of different college buildings in the university, in addition to a number of university hospitals. Since 2016, the University of Damascus has installed a number of solar collectors to obtain hot water based on solar energy. we find that the application of sustainable development policies related to the using of the clean and renewable energy led to the generation of energy from renewable sources by 11% of the total electrical energy consumed at the university of Damascus. The university has been able to reach lots of indicators of the sustainable development goals and it remains apply others. Also, the university affected the climate crisis by using this type of clean energy. We include more information about the green areas in Damascus University in the third section of this file. As part of its commitment to mitigate the climate crisis, the university

sought to move towards a digital transformation policy. Since 2017, the university has taken a number of measures in order to reach a sustainable digital transformation policy. The university has shifted from accrediting paper journals in the journals section issued by the university to the electronic journals system only. In 2018, the accreditation of the paper journals system issued by the university was revoked and replaced with the open-source journals system (OJS), which contributed to reducing the university's consumption of paper needed to print paper journals, which reflects positively on the environment and thus helps mitigate the climate crisis. In a related framework, the university has started a policy of recycling the produced paper as waste paper in the university, as the University of Damascus relied on recycling all the paper produced as waste in the university. At the University of Damascus, all types of paper produced are recycled, whether it is printing paper or paper resulting from the remnants of worn-out books, and so on. In another context related to environmental and water pollution, some higher institutes at the University of Damascus have started working on a number of projects aimed at purifying water and air. The University of Damascus has started conducting a number of doctoral and master's researches related to the purification of the waters of the Barada River passing through the governorates of Damascus and its countryside, which reflects positively on the environment surrounding the capital, Damascus, and its countryside. The Barada River is considered the lung of the

capital, Damascus, and its water has been heavily polluted by sewage water in some places, which has negatively affected the environment in the capital, Damascus, and rural Damascus. In this context, the university was keen to mitigate this crisis in pollution by conducting a number of researches aimed at purifying the water in the river, which reflects positively on the environment in the capital, Damascus, and thus has repercussions, albeit few, on the climate as a whole. We include more information about the green areas in Damascus University in the fourth section of this file. Damascus University is still seeking, within current and future plans, to reduce the climate crisis through a number of measures aimed at reaching the United Nations Agenda 2030 in the Sustainable Development Goals on the one hand, and to reduce the climate crisis on the other hand. A number of measures that Damascus University seeks to implement in the near future are presented as additional measures to commit to reducing the climate crisis and mitigating global warming.

## **2-Green areas effects and Agriculture procedures**

The university of Damascus started to apply multiple procedures related to the increasing of green areas in the full parts of the university. This includes the main branch of the university and the other three campuses of Damascus University. The university has undertaken scientific and practical plans to expand the green spaces within its campus and its surroundings. Where green spaces are an important

element that all government institutions are keen to take care of within their campuses and their surroundings because of its aesthetic value, health and environmental effects on human life, and it is necessary to educate communities about the importance of green spaces, how to preserve them, and their biodiversity, in order to achieve the goals of sustainable development. Based on its responsibility, location, expertise, scientific capabilities, efforts and initiatives in promoting a culture of sustainable development, Damascus University is keen to expand green spaces within its campus and its surroundings by planting forest and fruit trees, climbers, annuals and roses, planting green spaces, rehabilitating and maintaining gardens in all parts of Damascus University and its branches.

The university of Damascus created a division called a special section for gardens and green spaces in the university called the Parks Division. The main task of this division at the University of Damascus lies in the fact that it irrigate, prune, hoe, weed, cut lawns, trees and shrubs, shape them, transport plants, provide labor, carry out patching operations for both plants and invaders, maintain garden cleanliness, get rid of plant waste, fertilize and control the necessary work, in addition to carrying out all maintenance work related to green spaces, green fences, trees, operation and maintenance of irrigation networks in faculties in proportion to new and old plant arrangements.

The aim of agricultural work in the university is to increase the green areas and areas in it, and to plant beds of trees and various plants in the streets to increase the aesthetics of the general site, and to cultivate various plants and replace annuals in proportion to the seasons of the year to increase the aesthetics of gardens, and this of course is reflected in the environment of Damascus Governorate as a whole as well as in the climate commitment strategy. The Gardens Division is also working on cultivating various plants for an educational and research purpose for students of science, architecture and the College of Agriculture, as well as planting seeds and medicinal and aromatic plants (sagebrush, rosemary, fragrant, etc.) for an educational purpose for students of the Colleges of Pharmacy and Science (medical garden, ecological garden) and increasing students' experience and applying practical research as in the production facility. Since 2015, the Gardens Division at the University of Damascus has designed and installed irrigation networks that include electrical panels, pumps, sprinklers and automated points, which saves effort and time and brings scientific and educational benefit to students of the faculties of civil, electrical, mechanical and agricultural engineering, in addition to establishing apiary nurseries in the College of Agriculture for the benefit of college students.

The following pictures include some green areas of the university.



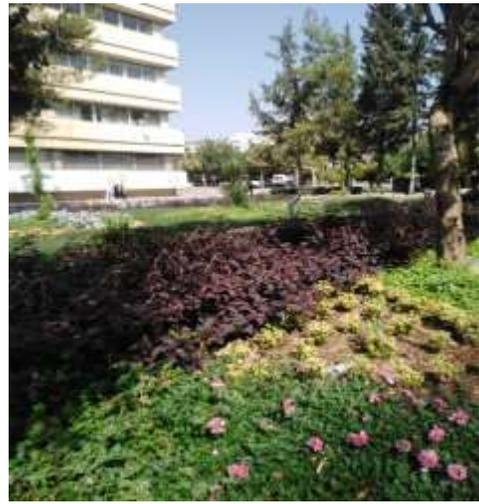
**Green areas in Faculty of Dentistry of Damascus University**



**Green areas in Higher Institute of Languages of Damascus University**



**Green areas in Faculty of Literatures of Damascus University**



**Green areas in Faculty of Medicine of Damascus University**



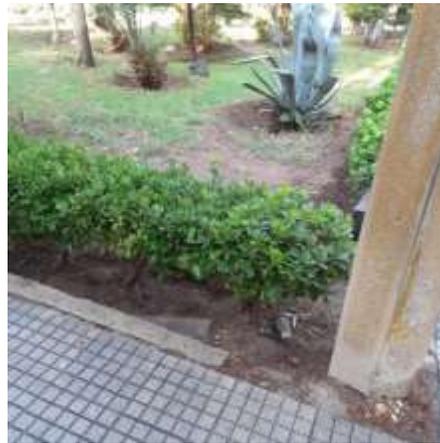
Green areas in Faculty of Civil Engineering of Damascus University



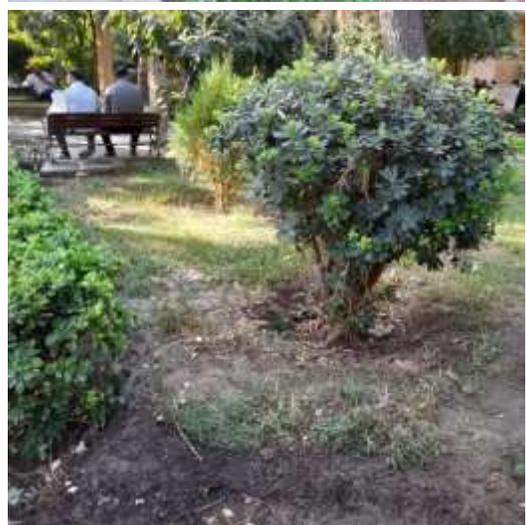
**Green areas in Faculty of Architectural Engineering of  
Damascus University**



**Green areas in Faculty of Tourism of Damascus University**



Green areas in the old gardens of Damascus University



**Green areas in garage of Damascus University**

These green areas are some examples of the green space of the university of Damascus.

The green space in the university gardens is distributed over 28.2 dunums in the Department of Medical Engineering, 2.4 dunums in the Faculty of Informatics Engineering, 6.7 dunums in the gardens of the Computer Technical Institute, the Technical Institute of Financial Sciences, and the Technical Institute for Financial and Banking Sciences. The area of the gardens in the Faculties of Dentistry and Human Medicine is 13 dunums, while the area of the production facility in the College of Agriculture is 100 dunums, the gardens of the Faculty of Law and Sharia are 10 dunums, the gardens of the Nursing School and the guesthouse are 18 dunums, and the gardens of the faculties of Economics, Education and Arts are 4 dunums, and the nurses' residence is 5 dunums. The area of gardens in the College of Science and the Higher Institute for Seismic Studies and Research and the environmental garden is 7 dunums, and in the university city of the Faculty of Mechanical and Electrical Engineering, Mezzeh and Barzeh 82 dunums, the gardens in the College of Agricultural Engineering 35 dunums, the gardens of the Agricultural Technology Institute in Mazraat Kharabo 550 dunums, the gardens of the university presidency and the central administration 6 dunums, in addition to the presence of 3 wells in (the presidency of the university, the College of Agriculture, and the College of Mechanical and Electrical

Engineering) in addition to the areas of gardens in the faculties of Daraa and As-Sawidaa and Qunatiraa.

In a related context, the University of Damascus has established an environmental garden in the Faculty of Agriculture at the university, within the framework of the sustainability of medicinal plant resources and their importance in light of the increasing demand for drugs of plant origin. Medicinal botanical gardens contribute to spreading awareness of the economic, environmental, and ethical importance of medicinal plants, and preserving them outside their location is desirable, with environmental considerations for sustainability, especially high-value wild species, some of which have slow growth rates, low densities, and narrow geographical ranges. Therefore, the sustainability of medicinal plant resources along with development opportunities is an imperative necessity in light of the increasing demand for plant-based drugs. Sustainable harvesting of medicinal plants is the title of the next stage.

The environmental garden at the Biocontrol Research and Studies Center in the College of Agriculture includes fifty species of medicinal plants whose use is reflected in the environment and climate and their use in the medical field as well. Where the ecological garden in the center includes the following plants:

- *Salvia officinalis* L. (Lamiaceae), the volatile oil is antibacterial, antifungal and antiviral, anti-perspiration,

high blood pressure, diabetes, and treatment of respiratory tract infections.

- Lemon verbena *Aloysiatriphylla* (LHer.) Britt (Verbenaceae)
- It is considered one of the best drugs for calming the nervous system, and anti-spasm associated with anxiety and insomnia. It also has antioxidant properties. Volatile oil is used in the treatment of inflammation of the mucous membranes lining the respiratory and digestive systems.
- Rosemary (*Rosmarinus officinalis* L. (Lamiaceae) has a role in treating blood pressure problems, loss of appetite, and the decoction of the plant is used in the treatment of digestive disorders, headaches, depression, and nasal and chest congestion associated with colds, influenza and allergies.
- Thyme *Thymus serpyllum*L (Lamiaceae) Thyme has properties for treating skin infections, rheumatic pain, antioxidant properties, respiratory spasmolytic, expectorant, anti-bacterial, viral, fungal, parasitic, used in the treatment of cough and respiratory bronchitis.
- Common thyme *Thymus vulgaris* L. (Lamiaceae) Common thyme has antioxidant properties, respiratory spasmolytic, expectorant, antibacterial, viral, fungal, parasitic, used in the treatment of cough and respiratory bronchitis.
- *Laurus nobilis*L. (Lauraceae) The volatile leaf oil is used topically in the form of balms or ointments in the

treatment of rheumatic diseases, joints, nerve pain relief, gum and ear inflammation, wounds, bruises, diseases, and various skin infections.

- sealant, *Althaea officinalis*L. (Malvaceae) Root preparations are used internally in the treatment of inflammation of the mucous membranes lining the digestive system, and inflammation of the respiratory system, and the gelatinous substances present in the leaves and flowers are used in the preparation of sputum, cough, bronchitis and asthma medicines.
- Moringa (Tree of Life) *Moringa oleifera* Lam. (Moringaceae)
- This plant is important in protecting the liver from carcinogens, and in its recovery from hepatic disorders, and the root extract is used internally in the treatment of gastrointestinal disorders, epilepsy, paralysis, heart disorders, blood pressure, fever and colds, and externally in the treatment of gingivitis, abscesses, abscesses, rheumatism, and snakebites.
- Olive *Olea europaea* L. (Oleaceae) Its leaves have properties that lower triglycerides and blood pressure, lower blood sugar, and anti-fungal properties. A decoction of the leaves is used as a diuretic.
- Lemongrass: *Cymbopogon citratus*(DC) Desf(Poaceae) The leaves and the essential oil have analgesic, sedative, anti-emetic, and carminative properties for gastric and intestinal disorders.

- Fine and coarse basil (basil): *Ocimum basilicum* L. (Lamiaceae) Basil is considered an antispasmodic and a digestive stimulant. It is used in the manufacture of toothpaste, and for the treatment of ear and joint pain, skin diseases and malaria, and to relieve rheumatic pain, cold, joint congestion, pain and stress, and to prevent seasonal eye diseases and infections and boils.
- Marjoram: *Origanum syriacum* L. (Lamiaceae)
- The essential oil of marjoram has antibacterial, fungal, and viral properties. The extract of marjoram has antioxidant properties and a stimulant for the immune system. A decoction of the aerial parts is used as an antispasmodic, and for the treatment of inflammation of the mucous membranes of the digestive and respiratory systems.
- Obitran: *Achillea santolina* L. (Asteraceae) has antioxidant properties, and taking an extract of the herb Obitran helps improve kidney function, reduces blood sugar levels in people with diabetes, and has antibacterial and antifungal activity, a general tonic, tonic, expectorant, and digestive.
- Curry: *Murrayakoenigii* L. (Rutaceae) contain various antioxidant properties, have the ability to control diarrhea, digestive problems such as indigestion, peptic ulcers, diabetes, unhealthy cholesterol balance, are believed to have anti-cancer properties and to help protect the liver, and are important in the spice industry.

- Linden: *Elaeagnus angustifolia* L. (Elaeagnaceae) The fruits and flowers are used to treat nausea, vomiting, insomnia, asthma, jaundice, and tetanus (a bacterial disease). A decoction of the flowers (steam) is used with the volatile oil it contains to improve the work of the heart. The fruit paste is used topically to treat rheumatic pain and arthritis..
- Lilac: *Syringa vulgaris* L. (Oleaceae) A drug that treats parasitic intestinal worms, has been used as a treatment for malaria, a fever reducer, and the flowers treat skin rashes and wounds, and its raw flowers have a role in treating stomach problems such as flatulence or constipation.
- The salamander: *Ruscus aculeatus* L. Ruscaceae. It is a muscle astringent and diuretic, treats cases of hepatitis, irritable bowel disease and hemorrhoids, and is considered a bronchodilator, so it treats shortness of breath.
- Damascene rose: *Rosa damascene* L. (Rosaceae) A decoction of the fruits with seeds is used to treat cases of stones and sand in the kidneys. Rose water is used to cleanse and treat burns and skin care.
- Aloe vera: *Aloe vera* (L. Asphodelaceae) Aloe vera juice is one of the most important laxative drugs currently used in the treatment of constipation, speeds up the fat burning process, improves digestion and stimulates the work of the liver in ridding the body of toxins and absorbing

nutrients, the effectiveness of ointments in which the drug enters its composition to moisturize dry skin, and treat many skin diseases.

- Fennel: *Foeniculum vulgare* Mill. (Apiaceae) Fennel oil has stimulating properties for the stomach and intestines, antispasmodic in cases of indigestion, and volatile fennel oil is used to stop diarrhea caused by bacteria, as a general tonic.
- Fragrant: *Pelargonium odoratissimum* (L.) L Her(Geraniaceae) The plant is used in the treatment of viral infections, as a flavoring for tea, as an insecticide (it can be used as a natural insecticide in gardens) and the volatile oil is very important.
- Peppermint: *Mentha vulgare* (Lamiaceae) The volatile oil has antispasmodic, antibacterial and antiviral properties, and is used for its sedative properties, and in the treatment of liver and gallbladder diseases, digestive disorders, spasms affecting the upper digestive tract, and the treatment of irritable colon. The volatile oil topically has a cooling effect on the skin.
- Green tea: *Bidens* spp. (Asteraceae) Antibacterial, dysentery, microbial, malaria, prevent liver damage and diuretic.
- Alunca: *Atharanthus vinca* (L.) (Apocynaceae) for the treatment of diabetes, wound healing, cancer and leukemia in children.

- Screens: *Compositae Tagetes erect L.* It is used in the treatment of respiratory infections, and as a repellent for nematodes.
- Chicory: *Mentha piperita L.* Lamiaceae oil is used topically as a skin antiseptic and is used to treat digestive disorders, and is sometimes used to treat intestinal worms.
- Saffron: *Crocus Sativus L* Iridaceae. It is used to treat depression and mental disorders, improve physical energy, hearing and memory, a heart tonic, and a central nervous system stimulant. There is the possibility of using it as a preventive agent and a treatment for cancer, in addition to using saffron oil or tincture topically in the case of arthritis, and soothing gum pain in children when teething begins.
- German iris: *Iris germanica L.* (Iridaceae) It is used in the treatment of bronchitis, asthma, and whooping cough. It is useful in the treatment of chronic skin diseases such as acne and eczema.
- Exotic: *Chrysanthemum morifolium Ramat.* (Asteraceae)
- The limbs are rubbed with flower oil to help treat rheumatism and gout. It is also rubbed on the skin to help treat scabies. The emulsion or flower oil is used to help treat mild intestinal catarrh, expel worms, strengthen the blood and increase hemoglobin.
- Violet: *Viola odorata L.* (Violaceae) It is useful in the treatment of cough, asthma, laryngitis, dry and chronic

bronchitis. The root decoction is used topically to treat skin diseases and bruises, and to accelerate wound healing. It is also used to treat rheumatism and inflammation of the mucous membranes of the mouth.

- Diamond: *Paronychia argentea* Lam (Caryophyllaceae)  
The leaves of the plant are used as tea, and this method is used to treat some diseases, such as: cold and cough, to increase immunity, some diseases of the digestive system, inflammation of the urinary system, inflammation of the gums, and arthritis.
- Cherry Tomatoes: *Solanum lycopersicum* var. *cerasiforme* (Solanaceae)
- It has a role in preventing cancer, improving eye health, digestion, heart and arteries, and preventing diabetes and its complications.
- Sunflower: *Helianthus annuus* L. (Asteraceae) It is a source of many vitamins and minerals that can support the immune system and increase the ability to fight viruses.
- Rutabaga: *Ruta graveolens* L. (Rutaceae) The leaves are used to treat hepatitis, dermatitis (eczema), and analgesic for toothache, earache, indigestion and diarrhea. The volatile oil is used topically for its properties in the treatment of rheumatism and joint pain.
- Ginger: Pearl Ginger (Zingiberaceae) helps promote heart and arteries health, contributes to lowering sugar

levels, helps prevent cancer, and contributes to treating headaches.

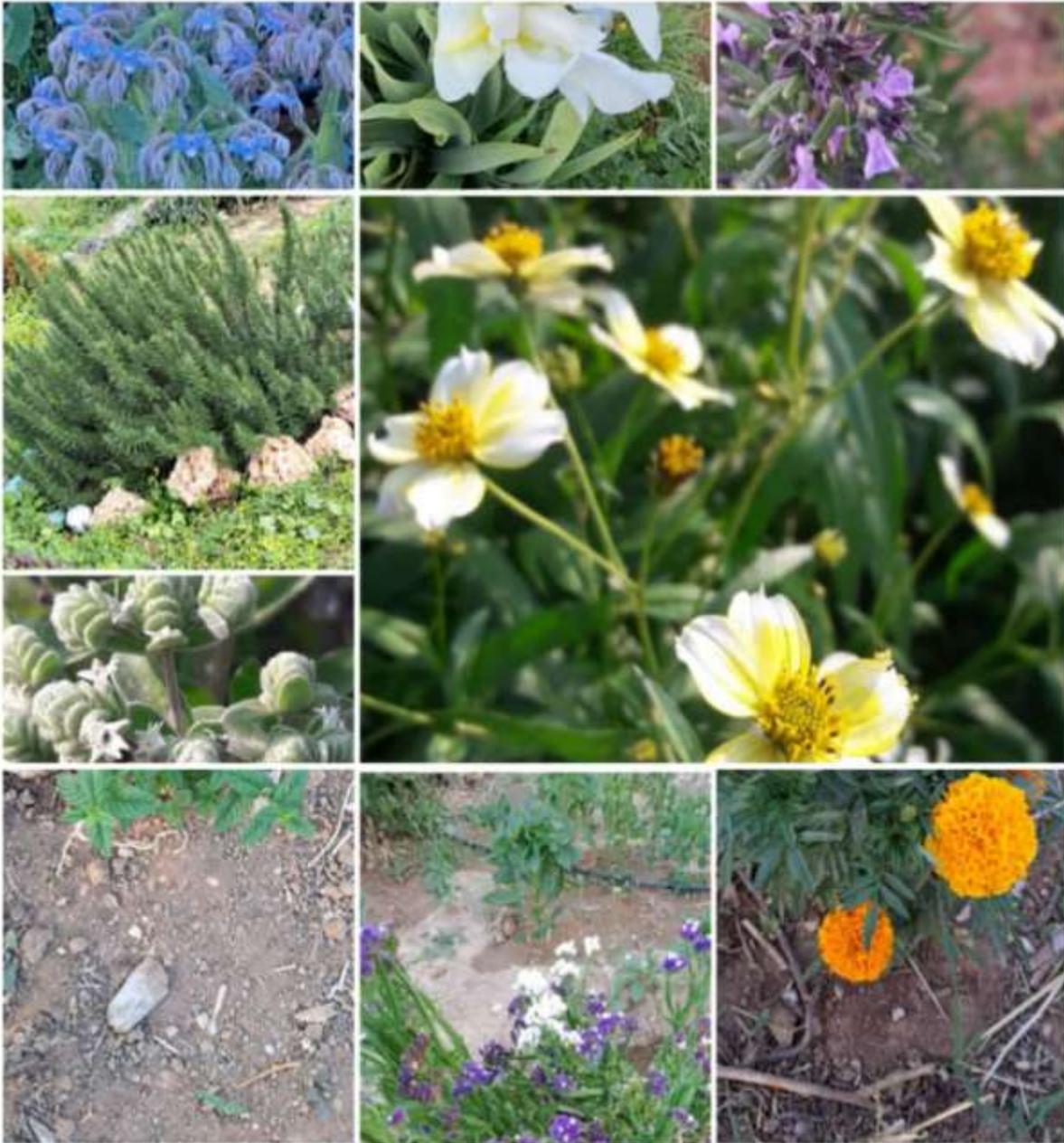
- Indian elderberry: *Sambucus ebulus*L. (Adoxaceae) The leaves and flowers are used for their diuretic, laxative, and diaphoretic properties. The leaf extract has antibacterial properties. It is also used in the treatment of rheumatism, chronic joint pain, colds, constipation, and as an emetic.
- Periwinkle: *Vinca major* L. (Apocynaceae) It is used as an antidigestive and antispasmodic, as well as in cases of diabetes. It is used externally to treat hemorrhoids. The plant has an effect on blood pressure and smooth muscles.
- Bananas: *Musa acuminata* (Colla) (Musaceae) is useful in promoting heart health, blood vessels, helping to reduce blood sugar levels, and treating some gastrointestinal infections.
- Bee bread: *Borago officinalis*L. (Boraginaceae) It is useful in breaking up stones, joint pain, weak mental powers, heart diseases, rheumatism, stomach ulcers, and urinary tract infections. The leaves and stem are used as a diuretic and antipyretic. As for the flowers, they are used as a laxative for the stomach. As for the seeds, they are used in the treatment of gum diseases.



**Some examples of the plants in the botanic garden in the Faculty of Agriculture of Damascus University**



**Some examples of the plants in the botanic garden in the  
Faculty of Agriculture of Damascus University**



**Some examples of the plants in the botanic garden in the  
Faculty of Agriculture of Damascus University**

Also, in the faculty of Agriculture in the university of Damascus, there are lots of studies aiming to mitigate of the climate crisis. Some of those studies is scientific research at Damascus University on reducing the use of chemical herbicides. In addition to the investments made by the Faculty of Agriculture at the University of Damascus in areas that do not have vegetation and are located around the faculty. Where the Abu Jerash area owned by the Faculty of Agriculture at the university was invested. The total area of the Abu Jerash farm is 120 dunums, including buildings and the "Al-Mubqarah" station, and it contains many forest trees such as evergreen cypress, white mulberry, three-thorn gladidia, logstrom, olives, Safoura, Mays, Zedrocht, Brunei pine, Lebanese cedar, oriental ficus, bird tongue, exhale (citrus), and these trees are irrigated through four wells in the farm.

The total area of the college gardens, including the garden of the biological control center, is about 34 dunums, and includes many ornamental plants such as roses, elderberries, thuja, coral ligustrum, halfa, annuals, ornamental cabbage, beach, umbrella, barberry, lavender, and rosemary, from which essential oil is extracted. In addition to the aloe vera plant used in some medical treatments, the area of the land planted with the Damascene rose was about 3 dunums (as an experiment to see the extent of its success due to its aesthetic, medical and economic importance). The college recently planted a number of cuttings of ornamental cherry trees "Sakura". As for agricultural crops, they spread over large areas in the college's

lands and included fodder crops to secure green fodder to feed the herd of cows with an area of 3.5 dunums of alfalfa and corn crops, in addition to summer vegetables with an area of 3 dunums (eggplant, zucchini, cucumber, cucumber, pepper). An area of 1 dunum to secure pasture for bees during the 2023 summer season. During the winter of 2022, the barley crop was cultivated on an area of 5 dunums, and research projects are being implemented for students of graduation projects and research projects for graduate students and professors in the farm, including a research on "yellow corn".

Kharabo farm in Eastern Ghouta has a total area of 550 dunums, and the percentage of the cultivated area is about 130 dunums, noting that all built-up buildings that need rehabilitation have been excluded, in addition to an area of 50 dunums for the college, The rest of the areas were allocated for agriculture according to the recently signed agreement with the Raiati Agricultural Investment Company, within a pre-established plan. There are also 3 wells to irrigate the farm.

In the interest of the University of Damascus to develop scientific and agricultural research in particular, the college, in cooperation with the production, research and educational facility, and within the framework of the scientific research agreement signed with the Raiati Agricultural Investment Company, carried out qualitative scientific research on the wheat crop in Kharabu farm, where it was cultivated on an

area estimated at about 80 dunums of type (hard wheat) in the first month of this year, and the amount of seed reached 30 kg / dunum. Wheat cultivation is of great importance as it is an important strategic, economic and food crop in Syria, and it constitutes the daily sustenance of the Syrian people, in addition to the benefit reaped from the wheat residue after harvest, which is used as fodder for livestock. In the same context, scientific research was conducted on the potato crop within the framework of the same agreement and in cooperation with the General Organization for Seed Multiplication in Syria, where the potato crop was planted last March of the type Spunta + Sham Fabula, with an area of about 50 dunums, in addition to planting some almond trees, and currently the college is working on cultivating some fodder crops.

All of the previous researches and procedures has their actual effects on commitment for mitigating the climate crisis, where the total green areas of the university of Damascus reached more than 63% of its total areas which affects positively on reducing the carbon emission which reflects on the climate crisis.

### **3-The use of clean and renewable energy**

In the framework of its endeavor to limit climate change, Damascus University has moved towards a policy of renewable and clean energies. In this context, Damascus

University has directed towards four types of clean and renewable energies, namely:

- 1) Solar Photovoltaic Cells.
- 2) Solar Thermal Power Cells.
- 3) Wind Turbines for Generate Electricity.
- 4) Fossil Energy for Heating.

In the framework of the use of solar cells to generate electric power, the University of Damascus signed a contract with the Energy Research Center in the Syrian Arab Republic in 2018 with the aim of building and installing photovoltaic solar panels to generate electricity in a number of university buildings, colleges and various institutes.

The most important result of these procedures is the installation of a number of solar energy panels in a number of university hospitals affiliated to Damascus University, such as Al-Mouwasat University Hospital and the Dermatology Hospital, which are owned by Damascus University. As a result of these procedures, a number of photovoltaic solar energy panels were installed in each of the University Student City of Damascus University or the student residence at Damascus University, and in the Faculty of Mechanical and Electrical Engineering at the University of Damascus. In addition to installing a number of photovoltaic solar cells in a number of administrative buildings at the University of Damascus, such as the communications building and telephone exchanges at the university.



The photovoltaic solar cells of Al-Mouwasat university hospital in  
Damascus University



The photovoltaic solar cells of University Student City at  
Damascus University

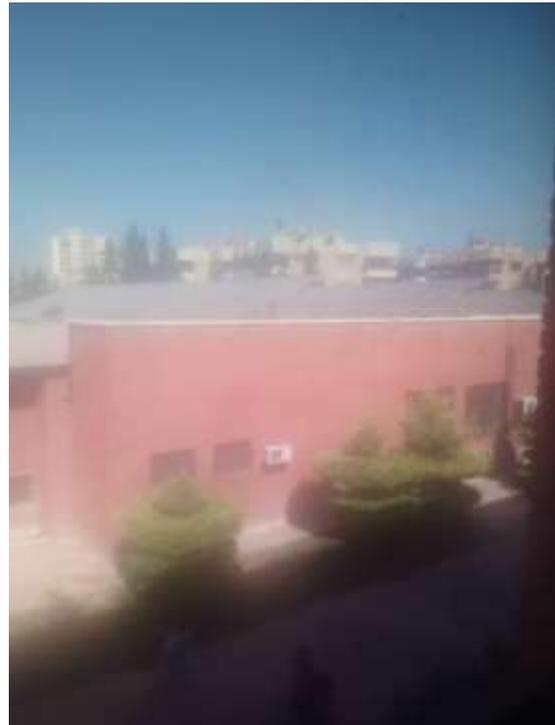
It is worth noting that the electrical energy generated from the photovoltaic solar panels installed in the Faculty of Mechanical and Electrical Engineering at Damascus University has reached 700 kWh. This contributed to the provision of clean and renewable electrical energy to the Faculty of Mechanical and Electrical Engineering at Damascus University. These photovoltaic solar panels were installed in the Faculty of Mechanical and Electrical Engineering at Damascus University in two phases in cooperation with the Energy Research Center in the Syrian Arab Republic. The first phase of the installation of the solar panels included the installation of a trial version with a relatively low capacity of 50 kWh, after which cells with a larger capacity of 650 kWh were installed. It should also be noted that the photovoltaic solar panels that were installed in the Faculty of Mechanical and Electrical Engineering at the University of Damascus are used in two ways:

- ✓ The first is to generate electric power used by the faculty of Mechanical and Electrical Engineering in the university of Damascus.
- ✓ The second is added to the local electrical network of Damascus Governorate when there is no significant use in the college, especially on holidays.

Of course, this is reflected in the use of fuel in the generation of electric power, which positively affects the improvement of combating climate change.



**Some of the photovoltaic solar cells of Faculty of Mechanical and Electrical Engineering at Damascus University**



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As for the second use of renewable energies in the University of Damascus, it is the adoption of a large number of university hospitals owned by the university, university buildings and some of its faculties in the adoption of solar energy for heating. The University of Damascus has installed a good number of thermal solar cells in order to heat the water.

Where a number of thermal solar cells were installed in Al-Mouwasat University Hospital, owned by the University of Damascus, and in the Dermatology University Hospital owned by the University as well. A number of thermal solar cells have also been installed in the School of Nursing at Damascus University.



Some of the thermal solar energy panels at the School of  
Nursing at Damascus University



Some of the thermal solar energy panels at the School of Nursing at Damascus University

Moreover, Damascus University has installed a large number of thermal solar cells in the university student city at Damascus University or the student residence at Damascus University. The university student city or university student housing at Damascus University relies entirely on these thermal solar cells to heat the water.



Some of the thermal solar energy panels of the University Student City of Damascus University or the student residence at Damascus University



Some of the thermal solar energy panels of the University Student City of Damascus University or the student residence at Damascus University



Some of the thermal solar energy panels of the University Student City of Damascus University or the student residence at Damascus University

On the other hand, but with less effectiveness, the University of Damascus has taken strides towards encouraging university students to research that serve clean and renewable energies. In the Faculty of Basic Sciences at the University of Damascus, a large number of researches concerned with the efficiency of solar and photovoltaic cells were launched. In the Faculty of Mechanical and Electrical Engineering at the University of Damascus, wind energies have been studied and utilized by installing a number of wind turbines to generate electrical energy based on wind energy. A wind turbine with a capacity of 5 kilowatt-hours has been installed, connected to the electrical network, described by an experimental model, with a low safety factor. In addition, a locally-made wind turbine with a capacity of 1 kilowatt-hour was installed on top of the modern building in the Faculty of Mechanical and electrical engineering at Damascus University. Also, in the same college, a Helix turbine was installed that does not need high speeds and does not need power steering, and its maximum capacity reaches 5 kilowatt hours, and it is made of light and cheap local materials - powered by solar or wind energy, or both. This homemade turbine is also characterized by a small and elegant design, and the yield can be increased by wind or by some improvements, and it is suitable for working with the rural house and its cost is low, and it does not require maintenance except to replace the accumulator every 3 years, and it can be placed in residential places or streets. Work has also been done at the University of

Damascus to benefit from fossil energy as an alternative energy source, which contributes to reducing greenhouse gas emissions.

#### **4-Other significant procedures and scientific research**

In addition to the previous directions of the University of Damascus in limiting climate changes in terms of green cover in the university and the use of clean and renewable energies, the university has taken many steps with other measures.

Some of these measures were related to the trend towards reducing the number of papers used in the University of Damascus, whether for printing or other uses. In this context, the University of Damascus has initiated many procedures, the most important of which is the comprehensive digital transformation, which began by relying on the university's e-book, in addition to adopting the method of open-source journals in the journals issued by the university.

Also, some of the other significant procedures depend on research and knowledge awareness, and this is done by conducting a number of researches related to environmental awareness and renewable and clean energies. We have mentioned in the second and third sections of this file a number of related researches. Where the researchers of the university of Damascus published a number of scientific research papers in reputed international journals, which are indexed and abstracted in the Scopus database. This was appeared clearly in the case of the published sustainable

development goals documents [1] by the researchers of Damascus University, where also this clarified in more details in the Sustainability section of the website [2] of the university of Damascus.

Damascus University, in the context of encouraging the use of environmentally friendly means of transportation, has built bicycle stands in a number of its faculties, as shown in the pictures. This led a large number of students to use these facilities and encouraged them to use bicycles to travel from their homes to the university and vice versa. Of course, this has repercussions on the environment, albeit at a low rate.

In this regard, Damascus University seeks to raise awareness among university students on the use of environmentally friendly means of transportation by directing students towards that. This is done in theory through introductory seminars, and in practice it is done by building these types of filters in all faculties and institutes of Damascus University. This stems from the University of Damascus's belief in moving towards a culture of environmental friendliness.

In a related context, the University of Damascus has directed the members of the educational staff at the University of Damascus towards the policy of mass transportation, due to its promising economic, environmental and social feasibility.



Some of the bicycle stands in the Faculty of Medicine at  
Damascus University

## **5-Conclusion and future procedures**

In this file, we presented the most important measures taken by the University of Damascus in the context of combating climate change, which was mainly manifested in increasing green spaces in all branches of the university and in all its faculties and buildings, in addition to the policy of using clean and renewable alternative energies. Finally, other measures such as digital transformation policy and directing a number of scientific researches towards environmental awareness.

Within the context of climate change reduction, Damascus University seeks a more effective future policy by increasing recycling in the university, in addition to moving towards digital transformation more effectively. In this context, the university seeks to increase environmental awareness among the university's academic members, staff and students, through scientific research in this field and community awareness in it.

## **References**

[1] Al-Raei, M. (2023). Analysing of the sustainable development goals in Damascus University during Syrian crisis using the strategy in the university and the bibliometrics data from SciVal. *Discover Sustainability*, 4, doi:10.1007/s43621-023-00140-y

[2] <https://www.damascusuniversity.edu.sy/index.php?lang=2>