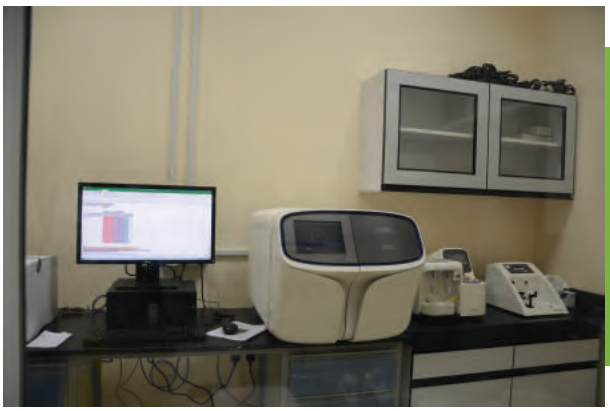
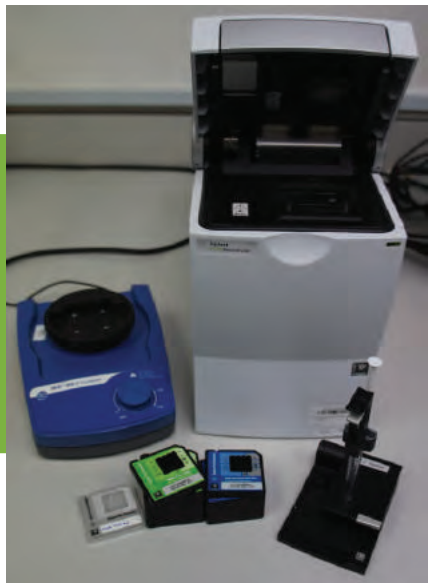
Biotechnology and OMICS laboratories

Next Generation Sequencing set-up *:

It includes IonS5, emulsion PCR, library size selector and genomic work bench server. It can do 200bp, 400bp and 600bp insert size, 60-80 million reads, 10-15 Gb data output per run of about 2 to 3hrs. It is used for microbial (bacteria, fungi), plant and human whole or partial genomics. It is used for Organelle genomes (chloroplast, mitocondria), metagenomics (soil, water, plant, animal, human), DNA methylation/mutation studies, and transcriptomics. In addition, it is used for pathogenic infections, public health, food safety and exome sequencing.



* In collaboaration with Oman Animal Plant Genetic Resources Center (OAPGRC)



Bioanalyser 2100:

With automated electrophoresis, provides sizing, quantitation, and purity assessments for DNA, RNA, and protein samples. It can be used for DNA/RNA fragment analyses for NGS sequencing. It can do QC, size distribution, PCR validation, restriction digestion, protien expression, food analysis, cleavage/mutation detection, vector assembly analysis, microarray etc.

DNA 120 OP:

These complete systems provide everything needed to quickly dry and concentrate small sample volumes in one fully integrated package. It has a single program that supports all DNA/RNA applications; For evaporating PCR buffers (aqueous); Water and Ethanol from DNA/RNA samples.

QuantStudio™ 5 Real-Time PCR System:

The QuantStudio™ 5 Real-Time PCR System is an ideal high-performance instrument with features for maximum experiment control. Applications including gene expression analysis, microRNA analysis, single nucleotide polymorphism (SNP) genotyping, copy number variation (CNV) analysis, and even protein analysis. This versatile technology can be used for both relative and absolute quantification methods. Protein Assays combine the sensitive, specific protein-binding capabilities of antibodies with the superior relative quantitation capabilities of 5' nuclease real-time PCR. In addition, it can do multiplex gene expression; pathogen detection and antibiotic resistance screening; miRNA quantification and analysis; and screening annealing temperatures for rare allele detection.

PCR System (Applied Biosystems USA):

We have three advanced and normal PCR systems. ProFlex PCR System has 3 x 32-well block option can run three different cycling conditions (0.2 mL/ 6.0°C/sec). Three different cycling conditions, at three different times by one or multiple users, so it can help to reduce time in optimization of protocol. This can be monitor remotely for different runs from smartphones or desktop computers. SimpliAmp PCR system is 96-well 0.2 ml with 3-zone VeriFlex Blocks 96 reactions; 4.0°C/sec; Touch screen; efficient and accurate; cloud based technology. GeneAmp®PCR System 9700 is a 96-well 0.2 ml and can do 96 reactions. It is used DNA amplification, Genetic diversity, Microbial identification, Pathogenic identification, Genomic sequencing, Genotyping, Cloning, Mutation detection, microarray and forensics.

Qubit™ 3.0 Fluorometer:

is the next generation of the popular benchtop fluorometer that accurately measures DNA, RNA, and protein using the highly sensitive quantitation assays. The concentration of the target molecule in the sample is reported by a fluorescent dye that emits a signal only when bound to to the target, which minimizes the effects of contaminants—including degraded DNA or RNA—on the result. It uses as little as 1 µL of sample.

Object Scan 1600 *

It is a workstation consisting of ObjectScan 1600 scanner, ScanWizard_Botany software, and MiVapp_Botany archive management system. This integrated workstation is characterized by, (1) On-top scan design for full-frame focus, (2) 1600 dpi (equal to 1 Gigabyte pixels) color CCD, (3) Optical Character Recognition (OCR) for specimen label and 1D barcode, and (4) image archive and privileged-account cloud management system

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Fermentor:

(BioFlo 320, next-generation bioprocess control station ; Eppendorf USA) is a Research and development in cell culture and microbiology; Bench- and pilot-scale fermentation of aerobic and anaerobic bacteria, yeasts, and fungi; Cultivation of mammalian, insect, and human cell lines; Specialized applications such as stem cell culture or biofeul/biopolymer development; Specialized packed-bed impeller for vaccine production in anchorage and non-anchorage dependent cell lines; Suitable for batch, fed-batch, and continuous processes; Biotransformation of secondary metabolites by microbes and Bioremediation strategies.

The ZOOM® IEF Fractionator kits:

Offers a fast, reliable method to reduce sample complexity, enrich low abundance proteins, and increase the dynamic range of detection. Solution phase isoelectric focusing with the ZOOM® IEF Fractionator provides reproducible separations in three hours. Fractionated samples are ready for further analysis by two dimensional gel electrophoresis (2DE), one dimensional gel electrophoresis (1DE), or two dimensional liquid chromatography/mass spectrometry (2D LC/MS).

Class II, Type A2 Biological Safety Cabinets:

Biological Safety Cabinets designed to protect personnel, product, and the environment from exposure to biohazards and cross contamination during routine procedures. Class II cabinet works with low to moderate risk biological agents. The existing cabinet also included UV light to keep a biosafety cabinet's interior clean when not in use.

xMark Microplate Absorbance Spectrophotometer (Biorad, USA) :

Is used for Enzyme-linked immunosorbent assay (ELISA), which can run 6- to 96 samples with wave length 200–1,000 nm and single and dual wavelength. It is used for enzyme inhibition assay and kinetics (Urease, a-Glucosidase, Acety cholenisterase; a-Amalyase, etc), anti-oxidant quantification; OD600; protein quantification; various colorimetric assays for microbiology, plant physiology, and biochemistry.

Denaturing gradient gel and Electrophoresis systems:

A set-up of DGGE is helpful for microbial diversity analysis in various samples from soil, water and plants. The electrophoresis system are both vertical and horizontal, which can run from 8 to 96 samples in one go.

Autoclave (SX 700E; Tomy; USA):

It is vertical top-open led autoclave about 550 L. It can run 25 to 250 ◦C with 7 different programs. It is used in microbiology and molecular biology and sterilization of microbial media.

Refrigerated centrifuge (ProScientific):

It can operature with various programable options. The centrifugation range is from 500 to 15,500 rpm with volume ranging from 0.2 ml to 50 mL. It is used for DNA/RNA and Protein extractions.

Digital Heating Shaking Drybath:

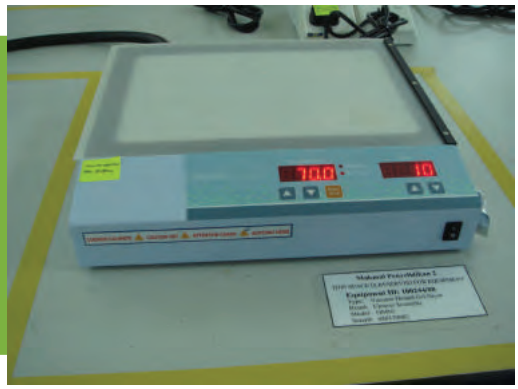
Speed range from 150 to 1500rpm (block dependent); 0 programs, up to 10 steps per program; 150 to 1,500rpm (96-well block); 150 to 1,200rpm (0.5mL, 1.5mL and 50mL tube blocks).

Thermo Scientific Heraeus Pico 17 microcentrifuge:

Performance up to 17,000 x g with fast acceleration and deceleration. Standard rotor runs 24 microcentrifuge tubes in a single row, from 1.5 to 2.0 mL tubes to mini-preps and spin columns.

Tissue homogenizer:

It is used for grinding and homogenization of soft and Hard Tissue for cellular, biological; and DNA/ RNA and Protein extractions.



Gel-Drier (LabTech):

It has microprocessor control temperature and timer dryer (85 C) and can dry gels 10 x 10 cm size.

Gel Documentation System:

It used for gel documentation, fitted with Pre-focused 5 mega pixel monochrome camera and Interchangeable filter slide with 620nm. It is used for DNA/RNA/Protein gel electrophoresis analysis.

Fisher Scientific™ Bead Mill 24 Homogenizer:

Used for variety of applications that require grinding, lysing, and homogenization of biological samples prior to molecular extraction: DNA/RNA extraction, tissue homogenization, protein purification.

The Thermo Scientific™ Pierce™ Power Blotter:

Is designed specifically for rapid semi-dry transfer of 10-300 kDa proteins from polyacrylamide gels to nitrocellulose or PVDF membranes in 5 to 10 minutes. The Pierce Power Blotter features an integrated power supply optimized to enable consistent, high-efficiency protein transfer when used with commonly used precast or homemade gels (SDS-PAGE).

The Mini Gel Tank:

Is compatible with a variety of Novex® gels, NuPAGE® gels, and Bolt® Bis-Tris Plus gels. Each Mini Gel Tank can accommodate up to two gels per run. The unique tank design enables convenient side-by-side gel loading and enhanced viewing during use. SDS-PAGE analysis for proteins.

Bioinformatics Server, Lenovo P910 Workstation:

It is a 2 x Intel Xeon E5-2650 v4 Processor (30MB Cache, 2.20GHz; 22 core processor), 384GB RAM (12 x 32GB 2400MHz ECC RDIMM 12) 2 x M.2 512GB PCIE SSD, and 4 x 4TB Hard Drive. It is used for de novo assembley, genome mapping, and various bioinformatic analysis to analyze genomic and transcriptomic dataset. It uses online available modules/-suits as well as CLC genomic workbench for sequence analysis.

Dell Precision 7910 Tower Workstation:

For molecular docking, drug discovery and protein-ligand interaction server with 4 cores running at 3.1Ghz and 96GB RAM for simulations and modeling.

Supporting instruments

Cold storages (SANYO; LG):

It ranges between -80 ◦C (600 L); -20 ◦C (500 L); 4 ◦C (550 L) fridges for keeping samples for long-term uses and experimentation.

Freeze-Drier (LabTech):

It is vacuum-Freezing (-56 ◦C), which can be used to freeze-dry samples for phytochemical, microbiology and antioxidant analysis. Its sample volume ranging from 0.1 to 1000 uL; 1 to 100 mL volumes; 1.0 mg to 250g.

Ultra sonicator Elmasonic P:

Special functions such as Sweep, Pulse and Degas can be individually activated and complete the equipment.

Supporting instruments

Vertex:

Touch and manual vertexing for volumn ranging from 0.1 to 1000 uL; 1 to 50 mL volumes. The rotation can range to 1500rpm.

Ice maker (LabTech):

It makes flakes with an out-put ranges between 1 to 2 Kg per hour.

Table top centrifuge:

Machines for root temperature centrifugations. For RNA/DNA extractions.

Incubators:

3 different incubators are currently available with different experimental prospects. The size of these incubators ranging from 30 l to 60L and can run 25 to 85 ◦C.

Supporting instruments

Incubators and open Shakers (Korea):

Open and closed incubator shakers are used to growth microorganisms. The capacity range from 50 ml to 2.5 L and can run on 300 rpm; orbital/reciprocal with a temperature of 25 to 55 ◦C.

Dry Bath (Cleaver Sci):

Dry heating block which control temperature from 37 to 150◦C and volumn ranges from 1.0mL to 50mL.

HANA pH and electrical conductivity meters:

Wide ranges of pH meter for biotech, omics and microbiology parts.