SECTION 1: COUNTRY OVERVIEW & GEOGRAPHIC PROFILE

1.1 Basic Country Information

Country Name	United Arab Emirates
Capital City	Abu Dhabi
BRICS Status	Extended Member – Joined January 2024
Total Population	9.28 million (2020 Census, FCSA); ~11.35 million (2025 est., IMF)
Population Growth Rate	0.78% per annum (2023, World Bank)
Rural Population (%)	12.2% of total (2023, World Bank)
Urban Population (%)	87.8% of total (2023, World Bank)
GDP (Nominal)	USD 569.1 Billion (2025 est., IMF)
GDP per Capita	USD 51,348 (2025 est., IMF)
Agriculture's Share of GDP	0.7% (2023, World Bank)
Agriculture's Share of Employment	~1.3% of total workforce (2023, EU Commission/World Bank)
HDI Rank	15th globally; Score: 0.94 (2025 UNDP Human Development Report)
Official Language(s)	Arabic (official); English widely used in business
Currency	UAE Dirham (AED); pegged at 1 USD = 3.6725 AED

1.2 Geographic Coordinates & Physical Extent

Total Geographic Area	83,600 km² – Rank 114th in world
Northernmost Latitude	26°25′ N (Ras Musandam, Oman exclave border)
Southernmost Latitude	22°35′ N (edge of Rub al Khali / Empty Quarter)
Easternmost Longitude	56°23′ E (Ras Al Khaimah)
Westernmost Longitude	51°35′ E (Qatar border area)
Geographic Centre (approx.)	24.0° N, 54.0° E (near Abu Dhabi emirate interior)
Total Coastline Length	1,318 km (Arabian Gulf ~700 km + Gulf of Oman ~70 km + islands)
Land Border Length	867 km (Saudi Arabia 457 km; Oman 410 km)
Number of Bordering Countries	2 – Saudi Arabia (west/south) and Oman (east/north Musandam)
Highest Elevation Point	Jebel Jais, 1,934 m (Ras Al Khaimah – highest point in UAE)
Lowest Elevation Point	Sea level (Arabian Gulf coast)
Major River Systems	No permanent rivers; seasonal wadis include Wadi Al Bih (~18 km), Wadi Ham (~30 km), Wadi Shi (~15 km)
Major Lakes	No natural freshwater lakes; man-made: Al Qudra Lakes (Dubai), Hatta Dam reservoir

1.3 Administrative Divisions Relevant to Agriculture

The UAE is a federation of seven emirates, each with significant autonomy. Agricultural governance operates at both federal (MOCCAE) and emirate level (ADAFSA for Abu Dhabi, Dubai Municipality for Dubai).

Primary Division (Emirates)	7 Emirates – Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah, Fujairah
Secondary Division (Municipalities/Regions)	Abu Dhabi: 3 regions (Abu Dhabi City, Al Ain, Al Dhafra); Dubai: 1 municipality; Other emirates: individual municipalities
Tertiary Division	Sectors/localities within municipalities; no formal block/commune system
Lowest Agricultural Planning Unit	Individual farm level – registered with ADAFSA (Abu Dhabi) or respective emirate authority
Special Agricultural Zones	Al Ain Region ('Garden City' – primary farming hub, 25,563 farms); Liwa Oasis (date palms, Empty Quarter fringe); Digdaga (Ras Al Khaimah – oldest farming area); Mleiha (Sharjah – experimental wheat farm, scaling to 1,400 ha)
Agricultural Development Regions	Food Tech Valley (Dubai – agritech innovation hub); ADQ AgTech Park (KEZAD, Abu Dhabi – 200 ha); ICBA Campus (Dubai – biosaline research); Agwa Cluster (Abu Dhabi – AED 90B expected GDP contribution)

SECTION 2: AGRO-CLIMATIC ZONES & CLASSIFICATION

2.1 National Agro-Climatic Zone Classification System

Classification System Used	No formal national agro-climatic zone classification published; zones delineated by ICBA, ADAFSA, and academic research based on geography, rainfall, and soil
Total Number of Agro-Climatic Zones	4 (Coastal Plains, Desert Interior, Mountain/Eastern, Oasis Regions)
Basis of Classification	Combination of rainfall, temperature, altitude, soil type, and groundwater availability
Reference Authority	Ministry of Climate Change & Environment (MOCCAE); Abu Dhabi Agriculture & Food Safety Authority (ADAFSA); International Center for Biosaline Agriculture (ICBA)

2.2 Zone-wise Detailed Description

Zone	Region	Climate	Major Crops	Key Challenges
1. Coastal Plains	All seven emirates — low-lying strip along 1,318 km coastline (18% of area)	Hyper-arid coastal; <120 mm rain; 27–28°C avg; summers 35–48°C with 80–95% humidity; ~180-day growing season (Oct–Mar)	Protected vegetables (tomatoes, cucumbers, peppers), date palms, ornamentals	Extreme humidity/heat, soil salinity, sabkha intrusion, sea-level rise; 100% irrigated (desalinated water)
2. Desert Interior	Western Abu Dhabi (Al Dhafra), southern interior of all emirates (66% of area)	Hyper-arid desert; <50 mm rain (some years near zero); 28–30°C avg; summers 40–52°C; ~150-day growing season (winter only)	Date palms (Liwa oasis), experimental Salicornia, halophytes, quinoa trials	Extreme heat, groundwater depletion, sand encroachment, zero surface water; <0.5% land under agriculture
3. Mountain/Eastern (Al Hajar)	Ras Al Khaimah (Jebel Jais), Fujairah, eastern Sharjah (5% of area)	Semi-arid mountain; 150–350 mm rain (highest in UAE); 22–26°C avg; frost possible above 1,500 m; ~240-day growing season	Vegetables, citrus, mangoes, pomegranates, herbs, date palms, honey	Rugged terrain, flash floods, limited arable land, slope erosion; traditional falaj irrigation + modern drip
4. Oasis Regions (Al Ain & Liwa)	Al Ain city & surrounds, Liwa crescent (Al Dhafra) (11% of area)	Arid oasis; 80–100 mm rain; 27°C avg; summers 35–47°C; ~200-day growing season (Oct–Apr)	Date palms (8.5M trees in Al Ain), vegetables, citrus, fodder (Rhodes grass, alfalfa)	Groundwater depletion (1.5 m/year drop), increasing salinity, sand encroachment; 100% irrigated

SECTION 3: CLIMATE, RAINFALL & TEMPERATURE EFFECTS ON AGRICULTURE

3.1 Overall Climate Classification

Köppen Climate Classification	BWh (Hot Desert Climate) – covers entire country
Dominant Climate Type	Hyper-Arid / Hot Desert with subtropical influence on eastern coast
Monsoon Season (if applicable)	Not applicable – no monsoon; occasional Indian Ocean weather systems affect Fujairah coast (Jul–Sep)
Number of Distinct Seasons	2 – Hot Summer (May–September) and Mild Winter (November–March); transitional months Oct and Apr

3.2 Rainfall Pattern & Agricultural Implications

National Average Annual Rainfall	~78 mm/year (FCSA/NCM)
Highest Rainfall Zone	Al Hajar Mountains (Ras Al Khaimah/Fujairah) – 150–350 mm/year
Lowest Rainfall Zone	Western Desert (Liwa/Al Dhafra) – <50 mm/year; some years near zero
Rainfall Distribution Pattern	Highly erratic/seasonal – >80% falls Nov–Mar in brief intense episodes
Monsoon Onset (avg.)	Not applicable (no monsoon system)
Monsoon Withdrawal (avg.)	Not applicable
Drought-prone Areas	Entire country is drought-prone; western desert most severe; multi-year droughts common
Flood-prone Areas	Wadi systems in eastern mountains (Fujairah, RAK); urban Dubai experienced unprecedented flooding in April 2024
Average Rainy Days per Year	10–25 days nationally; <10 in western desert
Rainfall Variability Index	Very High (CV >50% interannual variability)
Groundwater Recharge Rate	~300 MCM/year (vs. extraction >2,000 MCM/year – severe deficit)

3.3 Temperature Effects on Agricultural Production

Mean Annual Temperature	27–28°C
Hottest Month & Temperature	July–August: avg. 36–42°C; absolute max >52°C recorded in desert interior
Coldest Month & Temperature	January: avg. 14–18°C; absolute min ~3°C in mountain areas
Frost Occurrence Zones	Very rare – occasional at Jebel Jais (>1,500 m) and Al Ain desert fringe (radiative cooling)
Heat Stress Threshold Crops	Most vegetable crops above 40°C; wheat above 35°C; date palms tolerate up to 50°C
Chilling Requirement Crops	Temperate fruits (apples, cherries) cannot be grown – insufficient chill hours
Growing Degree Days (GDD)	>6,000 GDD annually (base 10°C) – among highest globally
Temperature Trend (last 30 yrs)	+0.4°C to +0.6°C rise per decade (MOCCAE/NCM); accelerating since 2000

3.4 Climate Change Impact on Agriculture

Observed Climate Anomalies	Increasing frequency of extreme rainfall events (April 2024 record floods); rising sea surface temperatures in Arabian Gulf; heatwave frequency tripled since 1980s
Projected Temperature Rise by 2050	+1.5°C to +2.5°C above 1990 baseline (UAE NDC/IPCC AR6)
Projected Rainfall Change	Uncertain: models show +10% to -20% variability; increased intensity of individual events
National Climate Adaptation Policy	National Climate Change Plan 2017–2050 (MOCCAE); UAE Net Zero by 2050 Strategic Initiative; UAE NDC (updated 2023)
Climate-Smart Agriculture Programs	AIM for Climate ($29.2B mobilized globally, UAE-US co-led); ICBA research programs; Masdar City renewable energy for agriculture; cloud seeding program (~300 missions/year)

3.5 Climate-Resilient Agriculture and Climate Action

Initiative / Technology	Implementing Institution	Description	Impact / Benefit
AIM (Agriculture Innovation Mission) for Climate	UAE-US Co-Led (launched COP26)	Global innovation initiative for climate-smart agriculture	600+ partners from 275 countries
ICBA Biosaline Research	ICBA, Dubai (est. 1999)	Salt-tolerant crop varieties, quinoa adaptation, halophyte farming	15,000+ accessions in genebank; 5 quinoa lines for extreme conditions; adopted in 10+ countries
Cloud Seeding Program	National Centre of Meteorology (NCM)	Ground-based nano-material flares and drone-based seeding to enhance rainfall	~300 missions/year; measurable rainfall increase in target areas
Desert Control LNC	Desert Control (Norway) + ICBA	Liquid NanoClay transforms desert sand into water-retaining soil in 7 hours	47–62% water savings; 17–62% yield increase in verified trials
Masdar City AgTech	Masdar / Abu Dhabi	Renewable energy-powered controlled-environment agriculture	Solar desalination units for farms; net-zero agriculture prototypes
Sharjah Mleiha Wheat Farm	Sharjah Govt / MOCCAE	Experimental wheat cultivation at scale in arid conditions	Scaling to 1,400 hectares by 2025; testing heat-tolerant wheat varieties

3.6 Overall Impact of Climate-Smart Agriculture Programs

Total area under agricultural technologies used	~5,000–10,000 ha under modern irrigation; 330,000 sq ft (Bustanica) + growing vertical farm area
Estimated emission reduction potential	UAE targets 31% GHG reduction by 2030 vs BAU (UAE NDC 2023); agriculture share minimal given 0.7% GDP
Major implementing institution	MOCCAE, ADAFSA, ICBA, Emirates Development Bank, Abu Dhabi Investment Office
Policy framework	National Climate Change Plan 2017–2050; UAE Net Zero 2050; National Food Security Strategy 2051; UAE Water Security Strategy 2036

SECTION 4: CROPPING PATTERNS & AGRICULTURAL CALENDAR

4.1 Seasonal Cropping System

Season Name	Local Name	Months	Regions Covered	Major Crops
Winter Season (Primary)	Al Shitaa	Oct–Mar	All emirates	Vegetables, wheat (exp.), barley, date harvest (Sep–Dec)
Summer Season (Limited)	Al Saif	Apr–Sep	Protected cultivation only	Heat-tolerant varieties in greenhouses; fodder crops (alfalfa, Rhodes grass)
Perennial / Year-round	—	Jan–Dec	All emirates	Date palms, ornamental plants, fodder (under irrigation), vertical farm crops

4.2 Major Food Crops

Staple Cereals	Minimal: wheat (experimental, Sharjah Mleiha farm – scaling to 1,400 ha); barley trial plots; total cereal production ~23,100 MT (FAO 2023). UAE imports ~1.7 million MT wheat/year.
Pulses / Legumes	Negligible domestic production; entirely imported from India, Australia, Canada
Oilseeds	Not commercially grown; all edible oils imported
Root & Tuber Crops	Small-scale: onions, potatoes under protected cultivation in RAK and Al Ain
Vegetables (Major)	Total ~233,009 MT (FAO 2020). Top 5: Tomatoes (22% of veg area), Cucumbers, Onions, Eggplant, Cabbage. Grown in greenhouses and open fields (winter).
Fruits (Major)	Total ~361,471 MT (FAO 2020). Dates dominate (~97%). Others: Citrus (lemons, limes), Mangoes (Fujairah, RAK), Papayas, Figs (limited).
Plantation Crops	Not applicable – no tea, coffee, rubber, or coconut production
Spices & Condiments	Not commercially produced; limited herb cultivation in vertical farms (basil, mint, coriander)
Flowers & Ornamentals	Growing sector: commercial nurseries in Al Ain and RAK; municipal greening programs consume significant water
Medicinal & Aromatic Plants	Limited R&D: ICBA researches indigenous species (Sidr/Ziziphus, Moringa); traditional medicine uses Henna, Myrrh

4.3 Cash Crops & Industrial Crops

Major Cash Crops	Dates (primary – 405,146 MT/year, FAO 2023); vegetables for domestic market
Industrial Crops	None at commercial scale; Salicornia (biofuel/animal feed research by ICBA)
Bioenergy Crops	Experimental: Salicornia for biodiesel (ICBA/Masdar); algae biofuel research (Khalifa University)
Fibre Crops	Not produced domestically
Beverage Crops	Not produced domestically; UAE is a major re-exporter of coffee and tea

4.4 Cropping Intensity & Productivity

Cropping Intensity (national avg.)	~100–110% (single crop/year on most land; perennial palms + winter vegetables on some farms)
Average Crop Yield – Cereals	Data limited; experimental wheat yields ~3–4 t/ha (Mleiha farm, non-verified at scale)
Average Crop Yield – Pulses	Not applicable (no domestic production)
Average Crop Yield – Oilseeds	Not applicable (no domestic production)
Total Food Grain Production	~0.023 million tonnes/year (FAO 2023 – negligible)
Total Horticulture Production	~0.5 million tonnes/year (vegetables + fruits, FAO 2020)

4.5 Major Crop Varieties and Yield/ha

Crop	Important Varieties (UAE)	Average Yield (t/ha)	Notes
Dates	Khalas, Barhi, Lulu, Fardh, Dabbas, Khenezi, Bou Ma'an, Nghal	6-10 (avg)	120+ varieties cultivated; 40M trees; 8th globally
Tomatoes	Hybrid varieties in greenhouses (e.g., Merlice, Piccadilly)	150–300 (greenhouse)	22% of vegetable area; year-round in protected cultivation
Cucumbers	Beit Alpha types, Lebanese varieties	150–350 (greenhouse)	Second largest vegetable crop
Lettuce/Leafy Greens	Romaine, Butterhead, Arugula, Kale, Spinach	~330 t/ha/year (vertical farm)	Bustanica produces 1M+ kg/year
Rhodes Grass	Local accessions, Katambora	15–20 (irrigated)	91% of field crop area; 6–8 cuts/year; water-intensive
Alfalfa	CUF 101, Moapa	12–18 (irrigated)	124,290 MT (2016); govt discouraging due to water use
Onions	Red Creole, Texas Grano	25–35 (open field)	Winter season; Al Ain and RAK
Citrus	Lime (Seedless), Lemon (Eureka), Orange (Valencia)	8–15	Small scale; mountain and oasis regions
Strawberries	Hydroponic varieties (Albion, San Andreas)	25–35 (greenhouse)	Pure Harvest Smart Farms – premium market
Wheat (experimental)	Heat-tolerant varieties under trial	3–4 (estimated)	Sharjah Mleiha farm; not yet commercial scale

SECTION 5: AGRICULTURAL LAND USE & LAND RESOURCES

5.1 Land Use Classification

Total Geographic Area	83,600 km² (8.36 million ha)
Total Agricultural Land	~397,000 ha (4.7% of total area, World Bank 2021) – includes permanent meadows/pastures
Net Sown Area	~50,384 ha (arable land, World Bank 2023) – has declined from peak of ~254,918 ha (2003)
Gross Cropped Area	~55,000–60,000 ha (estimated; single-season cropping on most land)
Area under Forests	~317,000 ha (3.8% of total – primarily planted Ghaf, Prosopis, mangroves; World Bank)
Permanent Pastures & Grazing Lands	~347,000 ha (very sparse desert rangeland, FAO classification)
Land under Misc. Tree Crops & Groves	~68,800 ha under date palms and fruit trees (ADAFSA/FAO)
Culturable Waste Land	Limited due to extreme aridity; potential in mountain wadis and reclaimed sabkha
Fallow Land (Current)	Data not separately published; some abandoned farms due to water scarcity
Barren & Unculturable Land	~7.2 million ha (>86% of total area – sand desert, gravel plains, sabkha)
Non-agricultural Use	~300,000 ha (settlements, roads, industrial zones, ports – growing rapidly)

5.2 Irrigation Infrastructure

Total Irrigation Potential Created	~70,000–80,000 ha (all cultivated land is irrigated)
Total Irrigated Area	~50,384 ha (100% of net sown area – no rainfed agriculture exists)
Canal Irrigation Coverage	Not applicable (no surface water canal systems)
Groundwater Irrigation Coverage	~44% of total water supply; ~76,556 wells operational nationally
Tank / Reservoir Irrigation	Minimal – Hatta Dam (Dubai); small check dams in wadis (RAK, Fujairah)
Drip Irrigation Area	Government mandates drip/micro-irrigation for all new farms; est. 70–80% of irrigated area
Sprinkler Irrigation Area	~10–15% of irrigated area (mainly fodder crops); being phased out
Total Annual Freshwater Withdrawal (agri)	~3.0–3.5 BCM/year; agriculture consumes ~60% of total (39% productive agri + 11% greening + 10% forestry)
Major Irrigation Projects	Falaj irrigation systems (Al Ain – UNESCO World Heritage); Abu Dhabi treated wastewater reuse network; government subsidized solar desalination units for farms
Water Use Efficiency (crop/drop)	Conventional: ~0.5–1.0 kg/m³; Vertical farms: 8–10 kg/m³ (95% water saving vs. field)

5.3 Land Tenure & Farm Structure

Average Farm Size (national)	<3 ha (most are small family farms in Al Ain/RAK); corporate farms 10–200+ ha
% Smallholder Farms (<2 ha)	~60–70% of total farm count (ADAFSA registration data)
% Medium Farms (2–10 ha)	~20–25%
% Large Farms (>10 ha)	~5–10% (but contribute disproportionate share of output – corporate operations)
Dominant Land Tenure System	Government-allocated land grants to UAE nationals (free or subsidized); corporate leases in free zones; no private land market for agriculture per se
Land Reform Status	Federal Law No. 5/1979 grants agricultural land to nationals; Abu Dhabi provides 50% subsidies on inputs; land cannot be subdivided below minimum size
Cadastral / Land Records System	Fully digitized at emirate level (Abu Dhabi: ADAFSA farm registry; Dubai: DLD)
Women's Land Ownership (%)	Data not separately published; women can own property under UAE law; government programs encourage women in agriculture (e.g., ADAFSA women farmer initiatives)

SECTION 6: MAJOR SOIL TYPES, SOIL HEALTH & NUTRIENT MANAGEMENT

6.1 Soil Classification System

Classification System Used	USDA Soil Taxonomy (used by ICBA/Emirates Soil Museum soil surveys)
Total Number of Soil Orders Present	2 primary orders: Aridisols, Entisols – mapped into 10 great groups, 41 sub-groups, 74 series
Soil Survey & Mapping Authority	Emirates Soil Museum / ICBA (UAE Soil Information System – UAESIS); Environment Agency Abu Dhabi (EAD); Abu Dhabi ADAFSA
Coverage of Soil Survey	Abu Dhabi emirate: ~100% mapped (most detailed); other emirates: partial coverage; UAESIS contains 20+ digital maps

6.2 Major Soil Types – Zone-wise

Soil Type	USDA Name	Area (est.)	Zones / Regions	Key Properties	Suitable Crops
Sandy Desert	Torripsamments	~83% of UAE	Desert interior (Abu Dhabi, Liwa, Al Dhafra), coastal hinterland	Deep quartz/carbonate sand; <1% OM; poor water retention; pH 7.5–8.5	Date palms, halophytes (with amendment)
Calcareous Sand	Calcisols/Petrocalcids	~5–8% of territory	Northern emirates, gravel plains	Calcium carbonate cemented layers; poor drainage; alkaline	Limited – date palms, drought-tolerant species
Sabkha (Salt Flats)	Salorthids/Aquisalids	~7% of localized	Coastal Abu Dhabi, inland depressions	Salinity >200 dS/m (coastal); gypsum/halite crusts; waterlogged	Unsuitable for conventional farming; Salicornia potential
Gypsiferous Desert	Petrogypsids	Localized (no reliable %)	Al Dhafra, Liwa fringe	Gypsum crusts at 30–50 cm depth; calcium sulfate-rich	Very limited – deep-rooted palms only
Wadi Alluvium	Torrifluvents	<2% of territory	Eastern mountains (Fujairah, RAK wadis)	Loamy to sandy-loam; moderate OM; best natural fertility in UAE	Vegetables, citrus, mangoes, herbs
Mountain Rocky Soils	Lithic Torriorthents	~5% of territory	Al Hajar Mountains	Thin, rocky, well-drained; moderate pH 7.0–7.5	Terrace agriculture, fruit trees
Oasis Soils (Improved)	Haplocambids	~10,000-15000 ha (0.2%)	Al Ain oases	Loamy; highest suitability rating in UAE; centuries of organic amendment	Vegetables, date palms, citrus – ONLY ‘highly suitable’ soils

6.3 Soil Health Indicators & Nutrient Status

Soil Health Card Programme	Not available as formal card system; ADAFSA provides soil testing services; ICBA operates UAESIS digital soil mapping
National Average Soil pH	7.5–8.8 (alkaline across entire country)
Organic Carbon Status	>95% of area has LOW organic carbon (<0.5%); oasis soils may reach 0.5–1.0% from historical amendment
Nitrogen (N) Deficiency Zones	Virtually all agricultural land is N-deficient; requires synthetic fertilizer application
Phosphorus (P) Deficiency Zones	Widespread moderate-to-severe deficiency; calcareous soils fix P in unavailable forms
Potassium (K) Deficiency Zones	Moderate deficiency in sandy soils; less severe than N and P
Sulphur (S) Deficiency	Generally adequate due to gypsum content in many soils
Zinc (Zn) Deficiency	Common in alkaline/calcareous soils – affects ~60–70% of cultivated area
Iron (Fe) Deficiency	Widespread in alkaline soils; chlorosis common in citrus and vegetables
Boron (B) Deficiency	Moderate in sandy soils; less documented
Manganese (Mn) Deficiency	Localized in high-pH areas
Copper (Cu) Deficiency	Not widely documented as a major constraint

6.4 Soil Degradation & Conservation

Area under Soil Erosion (Wind)	~90% of country susceptible to wind erosion; active sand dune migration threatens farms in Al Dhafra and Liwa
Area under Soil Erosion (Water)	Limited to mountain wadis (Fujairah, RAK); flash flood erosion during winter storms
Waterlogging Affected Area	Coastal sabkha zones (~7% of Abu Dhabi); some irrigated date farms with poor drainage
Saline / Sodic / Alkali Soils	~77% of agricultural land affected by moderate-to-high salinity; 96% of groundwater wells face severe irrigation restrictions due to salinity (Mordor Intelligence 2025)
Soil Acidification Area	Not applicable – all soils are alkaline
Area under Desertification	Not separately quantified – entire country is desert; concern is agricultural land abandonment due to water depletion
Major Soil Conservation Programs	Abu Dhabi Soil Protection Policy (2024 decree by H.H. Hamdan bin Zayed); ICBA soil remediation research; Desert Control LNC trials; EAD environmental monitoring
Annual Soil Loss Rate (avg.)	Not quantified nationally; wind erosion dominant; avg 10–30 tonnes/ha/year estimated in exposed areas
Organic Matter Improvement Initiatives	Composting programs (ADAFSA); biochar research (UAEU); municipal green waste recycling to farms
Integrated Soil Fertility Management	ICBA leads research; ADAFSA provides extension services; emphasis on organic amendment, fertigation, and soil-less culture

6.5 Cross-Cutting Practices Improving Nutrient Use Efficiency

Practice	Description	Benefit
Fertigation	Injection of water-soluble fertilizers through drip irrigation systems	30–50% fertilizer savings; precise nutrient delivery; reduced leaching
Hydroponics / Soil-less Culture	Nutrient film technique (NFT) and deep water culture in vertical farms	100% nutrient use efficiency; zero soil-borne diseases; 95% water saving
Compost / Organic Amendment	Municipal green waste composting; date palm frond recycling into mulch	Improves water holding capacity of sandy soils by 40–60%
Liquid NanoClay (LNC)	Desert Control technology mixing clay nanoparticles with sand	Creates water-retaining soil layer; 47–62% water savings; proven in ICBA trials
Biochar Application	Pyrolyzed organic waste applied to sandy soils (UAEU research)	Enhances CEC, water retention, and microbial activity; sequesters carbon

6.6 Fertilizer Use and Nutrient Use Efficiency in UAE (Major Crops)

Crop	Typical Fertilizer Use (kg nutrients/ha)	NUE	PUE	Special Practice	Key Remarks
Date Palms	150–250 NPK/tree/year	Low–Moderate	Low (P fixation)	Organic manure + fertigation	Alkaline soils reduce P/Zn availability
Greenhouse Tomatoes	800–1,200 (NPK via fertigation)	High (closed system)	High	Recirculating nutrient solution	Precise dosing reduces waste
Vertical Farm Leafy Greens	Nutrient solution (custom NPK)	Very High (>90%)	Very High	Hydroponic NFT/DWC	Near-zero nutrient waste
Rhodes Grass / Alfalfa	200–400 NPK/ha/year	Moderate	Low–Moderate	Flood/sprinkler irrigation	Being phased out; high water/nutrient waste

SECTION 7: LIVESTOCK SECTOR PROFILE

7.1 Livestock Population

Total Cattle Population	~112,000 heads (incl. ~75,000 dairy cattle) – concentrated in large commercial farms
Buffalo Population	Negligible – not traditionally raised in UAE
Sheep Population	~2-3 million heads (meat breeds: Awassi, Najdi, Barbari)
Goat Population	~2-4 million heads (leading livestock; breeds: local Emirati, Shami/Damascus for milk)
Pig Population	Not applicable (not raised for cultural/religious reasons)
Poultry Population (Chicken)	~40 million broilers + ~2 million layers
Duck / Other Poultry	Minimal – some quail and ostrich farms (niche)
Equine Population	~25,000–30,000 horses (Arabian breed – culturally significant; racing/breeding industry)
Camel Population	~490,000–500,000 heads (racing, dairy, meat; one of the world's largest camel populations per capita)
Yak / Reindeer / Llama	Not applicable
Rabbit Population	Small-scale – <5,000 heads in niche farms
Honey Bee Colonies (Apiculture)	~10,000–15,000 colonies; concentrated in Hatta (Dubai), RAK, Fujairah mountains; Sidr honey is premium product

7.2 Livestock Production Data

Total Milk Production	~283,000 MT/year (cattle milk); ~3 million litres/year (camel milk – Camelicious); UAE imports >80% of dairy consumed
Average Milk Yield (cattle)	~25–30 litres/animal/day (commercial Holstein; well above regional average due to controlled environment)
Total Meat Production	~80,000–90,000 MT/year (est.); dominated by poultry (~55,000 MT broiler meat)
Total Egg Production	~350–400 million eggs/year (Al Ain Farms alone produces 160M)
Wool Production	Negligible – sheep are meat breeds, not wool breeds
Leather / Hides Production	Minimal – primarily by-product of imported livestock slaughter
Honey Production	~1000 tonnes/year (est.); premium Sidr honey commands $50–200/kg
Livestock Sector's GDP Contribution	Included in overall 0.7% agriculture GDP; separately not published; poultry alone is AED 2 billion investment
Livestock Export Value	Limited – camel milk products (Camelicious exports to 20+ countries); live animal re-exports

7.3 Animal Health & Veterinary Infrastructure

Number of Veterinary Hospitals	Multiple government and private facilities; ADAFSA operates veterinary labs in Abu Dhabi
Number of Veterinary Dispensaries	Mobile veterinary clinics serve remote farm areas; each emirate has municipal vet services

Veterinarians per 1000 Livestock Units	Data not separately published; well-resourced relative to livestock numbers
Major Livestock Diseases (endemic)	FMD (vaccinated against), PPR (Peste des Petits Ruminants), Brucellosis (monitoring), MERS-CoV (camels – surveillance active)
Vaccination Coverage (major diseases)	Near 100% for FMD and PPR in commercial herds; government provides free vaccinations
National Livestock Disease Control Policy	Federal Animal Health Law; ADAFSA Animal Health Regulations; OIE-aligned surveillance and reporting
Artificial Insemination Coverage	Widely used in commercial dairy (Holstein semen imports); camel AI programs at Camel Reproduction Centre
Exotic Breed Programme	Holstein-Friesian (dairy); Arabian horse breeding (Abu Dhabi Equestrian Club); camel cloning (world's first cloned camel 2009, Dubai)

7.4 Fodder & Feed Security

Area under Fodder Crops	~45,000–55,000 ha (Rhodes grass + alfalfa – 91% of field crop area)
Fodder Production (green)	~1.5–2.0 million tonnes/year (est. from Rhodes grass, 6–8 cuts/year)
Dry Fodder Availability	Date palm fronds and agricultural waste recycled; limited crop residue
Feed Grain Availability for Livestock	Almost entirely imported; ~3 million MT of grain/forage imported annually
Fodder Deficit (if any)	Chronic and severe – domestic production meets <30% of demand; reliance on imports from Pakistan, India, Australia, Sudan
National Fodder Development Programme	Government policy discouraging water-intensive fodder crops; Al Dahra operates overseas farms (US, Australia, Sudan) to secure supply; ADAFSA promotes salt-tolerant alternatives

7.5 Livestock Production

Sector	Species / Product	Avg Productivity per Animal	National Production
Dairy (Cow Milk)	Holstein-Friesian, Jersey	25–30 L/day	~350,000 MT/year
Dairy (Camel Milk)	Camelus dromedarius (racing/dairy lines)	5–8 L/day	~4 million litres/year
Egg Production	Hy-Line, Lohmann (commercial layers)	~280 eggs/bird/year	~3–4 billion/year
Broiler Meat	Cobb 500, Ross 308	~2.2 kg in 35–42 days	~60,000-70,000 MT/year
Goat/Sheep Meat	Awassi, Najdi, Barbari, Emirati local	~15–25 kg carcass	~40,000–50,000 MT/year
Camel Meat	Local dromedary breeds	~200–350 kg carcass	~10,000 MT/year (est.)

SECTION 8: FISHERIES & AQUACULTURE SECTOR

8.1 Fisheries Resource Base

Total Coastline (Exclusive Economic Zone)	1,318 km coastline; EEZ ~58,000–60,000 km² (Arabian Gulf + Gulf of Oman)
Continental Shelf Area	~53,000 km² (shallow Arabian Gulf avg. depth 36 m; Gulf of Oman deeper)
Major Fishing Zones	Abu Dhabi offshore (largest, >65% of UAE sea area); Umm Al Quwain; Ras Al Khaimah; Fujairah (Gulf of Oman – deeper, different species)

8.2 Production Statistics

Total Fish Production	~71,500 MT/year (marine capture + aquaculture, est. 2022–2023)
Marine Capture Fisheries Production	~68,000 MT/year (2022, declining from ~78,000 MT in 2017) – 95% of total
Aquaculture Production	3,526.5 MT (2022) across 17 registered farms – 5% of total; rapidly growing
Major Marine Species Harvested	Kingfish (Scomberomorus commerson), Hammour/Grouper (Epinephelus coioides – quotas reduced 40%), Shaari/Spangled Emperor (Lethrinus nebulosus), Farsh/Painted Sweetlips, Shrimp (Penaeus semisulcatus)
Major Aquaculture Species	Sea Bream (Sparus aurata), Sea Bass (Dicentrarchus labrax), Atlantic Salmon (RAS – Fish Farm LLC), Yellowtail Kingfish, Shrimp, Tilapia
Fisheries Sector GDP Contribution	Included in 0.7% agriculture GDP; separately ~0.1–0.2% of total GDP
Fish Processing Output	Limited domestic processing; UAE primarily imports processed seafood; Fish Farm LLC and others developing value-addition

8.3 Fishing Community & Infrastructure

Cold Storage Capacity (fish)	Integrated into Dubai's logistics hub; Waterfront Market (Dubai) handles 40,000+ MT/year
Fish Processing Units	~10–15 registered units; most fish sold fresh through traditional markets and modern retail
Seafood Export Value	~USD 150–200 million/year (est.); UAE re-exports ~70% of imported seafood to regional markets
Major Export Species for Fisheries	Shrimp (to Japan, EU); dried fish (to South Asia, East Africa); fresh fish (to GCC)
Fish Consumption per Capita	~26.4 kg/person/year (highest in GCC; global avg. 19.8 kg – FAO)

8.4 Aquaculture Development

Total Aquaculture Area	Data not separately published; estimated ~100–200 ha (cage + land-based combined)
Brackish Water Aquaculture Area	~50–80 ha (floating cages – primarily Fujairah and Dibba coast)
Freshwater Aquaculture Area	Minimal – <10 ha; limited freshwater availability
Marine Aquaculture (Mariculture) Area	Floating cage farming in Fujairah = 74% of aquaculture production (2022)
Seaweed Cultivation Area	Research stage – ICBA and ADAFSA pilot programs; not commercial scale

Pearl Oyster Cultivation	Cultural heritage; traditional pearl diving largely ceased; some pearl farm revival (RAK) for tourism
Cage Culture Extent	~50–70 floating cages; Fish Farm LLC operates major cage farm offshore Fujairah
Recirculating Aquaculture Systems	Fish Farm LLC Jebel Ali facility: 3,000 MT/year capacity (salmon, sea bass); growing sector
Major Aquaculture Development Schemes	MOCCAE aquaculture licensing framework; National Framework for Sustainable Fisheries 2019–2030; Abu Dhabi aquaculture zoning plan; target: significantly increase aquaculture share of total production

8.5 Major Fish Species and Their Production

Species / Product	Major Breeds / Varieties	Avg Productivity per Unit	National Production
Marine Capture Fish	Hammour (Grouper), Kingfish (*Scomberomorus* spp.), Emperor fish	~2–4 tonnes per fishing vessel/year	~65,000–70,000 tonnes/year
Shrimp	*Penaeus indicus*, *Litopenaeus vannamei*	~3–6 tonnes/ha/year (aquaculture farms)	~2,000 tonnes/year
Seabream (Aquaculture)	Gilthead seabream (*Sparus aurata*)	~25–35 kg/m³ in cage culture	~2,000–2,500 tonnes/year
Seabass (Aquaculture)	European seabass (*Dicentrarchus labrax*)	~20–30 kg/m³ in marine cages	~1,000 tonnes/year
Tilapia (Aquaculture)	Nile tilapia (*Oreochromis niloticus*)	~5–8 tonnes/ha/year in pond systems	~1,000–1,500 tonnes/year
Crabs	Blue swimming crab (*Portunus pelagicus*)	~200–300 kg per fishing vessel/year	~500–800 tonnes/year
Molluscs	Oysters, clams	~5–10 tonnes/ha/year	~500–700 tonnes/year

SECTION 9: GOOD AGRICULTURAL PRACTICES (GAP) & SUSTAINABLE FARMING

9.1 GAP Certification & Standards

National GAP Standard/Certification	Emirates Authority for Standardization & Metrology (ESMA) food safety standards; ADAFSA farm certification in Abu Dhabi; Dubai Municipality food safety regime
International GAP Certifications Adopted	GlobalG.A.P. widely adopted by commercial operations (Pure Harvest, Emirates Bio Farm); ISO 22000 (food safety); ISO 14001 (environmental management); HACCP for processing
Area/Farms under Certified GAP	Data not aggregated nationally; all farms supplying major retailers must meet ADAFSA/Dubai Municipality standards; ~50–70 farms GlobalG.A.P. certified (est.)
Organic Farming Certification Body	ADAFSA provides organic certification; Emirates Bio Farm uses EU Organic and USDA NOP certification; 3-year transition period required
Organic Farming Area	~5,419 ha (2020, FiBL) – up 15% from 4,700 ha (2017)
Organic Export Value	Limited – most organic production serves domestic premium market;

9.2 Integrated Pest Management (IPM)

National IPM Policy / Programme	MOCCAE Federal Pesticide Law regulates use; ADAFSA IPM extension services; emphasis on biological control in greenhouses
Farmers under IPM Programme	Majority of greenhouse/protected cultivation operations use some IPM; open-field adoption lower
Biological Control Adoption Rate	High in greenhouse sector (~60–70% of protected farms use beneficial insects); low in open-field date farming
Pesticide Consumption	Low by global standards due to small cultivated area; ~1.5–2.0 kg active ingredient/ha (est.); declining trend
Reduction in Chemical Pesticide Use	Government subsidizes biopesticides; progressive restrictions on WHO Class I pesticides; no national quantified reduction target published
Farmer Field School (FFS) Programme	ADAFSA operates training programs and farm visits; ICBA conducts farmer workshops; not formal FFS system
Bio-pesticides Registered	Growing list – MOCCAE registers biological control agents; Bacillus thuringiensis (Bt), Trichoderma, neem-based products approved

9.3 Soil & Water Conservation Practices

Conservation Agriculture Area	Not formally quantified; no-till is effectively the default in sandy soils; mulching practiced in organic farms
Mulching Practices Adoption	~30–40% of intensive farms use plastic or organic mulch; date palm frond mulching common
Cover Cropping Area	Minimal – limited by water cost; some inter-cropping in Al Ain organic farms
Contour Farming / Terracing Area	Traditional terracing in Fujairah/RAK mountain wadis; ~500–1,000 ha (est.)
Watershed Development Programmes	Federal dam construction (Hatta, Al Bih, others); ~130+ recharge dams and barriers built for groundwater replenishment

Rainwater Harvesting Structures	~130 dams and barriers; total storage capacity ~170 million m³; primarily for groundwater recharge, not direct agriculture
Water Use Efficiency Interventions	Government mandates drip irrigation for all new farms; subsurface drip expanding; vertical farms achieve 95% water savings; treated wastewater reuse at 15% and growing

9.4 Post-Harvest Management Practices

Post-Harvest Loss (cereal grains)	Not applicable at scale – minimal cereal production
Post-Harvest Loss (fruits & vegetables)	~10–15% (lower than global avg. of ~40% due to short supply chains and modern cold chain)
Cold Chain Infrastructure Coverage	Extensive – UAE has world-class cold chain; Dubai's JAFZA food cluster includes 92,100 m² warehouse with pre-built cold storage
Warehousing Capacity	JAFZA food cluster: 1.59 million m² total; KIZAD food zone expanding; multiple commercial cold stores
Modern Silo / Grain Storage Capacity	Strategic grain reserves managed federally; Abu Dhabi Grain Terminal at Khalifa Port; specific capacity classified
Food Processing Sector Coverage	568+ food and beverage processors registered; Al Khaleej Sugar at JAFZA = world's largest standalone sugar refinery (24,000 MT/day)
Packaging Technology Adoption	Advanced – modified atmosphere packaging, vacuum packing, aseptic packaging widely used in commercial operations

9.5 Farm Mechanisation

Farm Power Availability	High on commercial farms; small farms often use rented equipment; no national kW/ha figure published
Tractor Density	~10–15 tractors per 1,000 ha of crop area (est.); market growing at ~5% CAGR
Combine Harvester Availability	Very limited – minimal cereal production; some forage harvesters for Rhodes grass
Power Tiller Availability	Used in mountain terrace farming (Fujairah, RAK); limited numbers
Custom Hiring Centre Network	Not formally established; private contractor model for mechanization services
Drone Usage in Agriculture	Growing rapidly; MOCCAE/GCAA drone regulations updated 2023; used for crop monitoring, date palm spraying (ADAFSA pilots), and mapping
Precision Agriculture Technology Adoption	Very high in CEA sector (>90% of vertical/greenhouse farms use precision tech); ~10–15% of open-field farms

9.6 Digital & Precision Agriculture

AI-powered climate control in vertical farms (Bustanica, Pure Harvest)	optimizing temperature, humidity, CO2, and nutrients in real-time
IoT sensor networks across greenhouses	monitoring soil moisture, EC, pH, and plant health
Satellite imagery and drone-based crop monitoring (EDB-funded farm modernization)	Used for land monitoring and desertification mapping

Blockchain traceability pilots	Used for date palm supply chains
ICBA's CHAG – ChatGPT-powered agricultural advisory tool	launched at COP29 (Nov 2024) integrating 50+ years of research data
Silal's digital platform	connecting 1,100+ UAE farms to retail supply chains

9.7 Sustainable Agriculture Initiatives in UAE

Initiative	Description
UAE Food Security Strategy 2051	National strategy to increase domestic food production through technology
Hydroponic Farming Programs	Government-supported expansion of hydroponic vegetable production
Vertical Farming Initiatives	Large-scale indoor farms using controlled environment agriculture
Desert Agriculture Research	ICBA research on salt-tolerant crops and saline water irrigation
Water-Saving Irrigation	Drip irrigation widely adopted (~90% farms)
Climate-Smart Agriculture	Focus on resilient crops and efficient water use

SECTION 10: AGRICULTURAL EXPORT COMMODITIES & TRADE

10.1 Overall Agriculture Trade Profile

Total Agricultural Exports Value	~USD 6-8 Billion/year (2023, WAM) – includes re-exports
Total Agricultural Imports Value	~USD 25 Billion/year (2024, USDA-FAS); USD 23 Billion (2023)
Agriculture Trade Balance	Large import deficit (structural – UAE is fundamentally a food importer)
Agriculture's Share of Total Exports	~1.5–2.0% of total exports (UAE total exports ~USD 450B, dominated by oil/re-exports)
Agriculture's Share of Total Imports	~7–8% of total imports
Top Export Destination Countries	Iraq, India, Saudi Arabia, Oman, Kuwait (primarily dates, processed foods, re-exports)
Top Import Source Countries	India (~15% – rice, spices, fruits), Brazil (~12% – meat, sugar, soy), USA ($1.4B in 2024 – diverse), Australia, Pakistan, Netherlands, New Zealand
Membership in Agri Trade Blocs	WTO member; GCC common market; India-UAE CEPA (2022); UAE-Israel Abraham Accords FTA; multiple bilateral FTAs under negotiation

10.2 Top Agricultural Import Commodities

Commodity	Annual Import Volume	Major Supplier Countries
Wheat	~1.7–2.0 million tonnes	Australia, Russia, Ukraine
Rice	~900,000–1.0 million tonnes	India, Pakistan, Thailand
Maize (Corn)	~700,000–900,000 tonnes	Brazil, Argentina
Soybean & Soymeal	~600,000–700,000 tonnes	Brazil, USA
Sugar	~800,000 tonnes	Brazil, India
Vegetables	~1.5 million tonnes	India, Jordan, Iran
Fruits	~1.2 million tonnes	India, South Africa, Egypt

10.3 Top Agricultural Export Commodities

Rank	Commodity	Export Value (USD M)	Volume (est. MT)	Key Markets	Notes
1	Dates (fresh & processed)	~350–400	~150,000	India, UK, EU, Japan	405,146 MT produced; 8th globally
2	Vegetable Oils (re-export)	~500–600	N/A	GCC, East Africa	Processed/re-packaged from palm oil imports
3	Sugar & Confectionery	~400–500	N/A	GCC, Africa	Al Khaleej Sugar refinery – world's largest; re-export
4	Coffee/Tea/Spices (re-export)	~300–400	N/A	GCC, Levant	Re-packaged and distributed via Dubai hub
5	Fresh Fruits & Vegetables	~100–150	~50,000	GCC, Oman	Locally grown + re-exports
6	Fish & Seafood	~150–200	~30,000	Japan, EU, GCC	Shrimp, dried fish, fresh fish

Rank	Commodity	Export Value (USD M)	Volume (est. MT)	Key Markets	Notes
7	Dairy Products (re-export)	~100–150	N/A	GCC, Iraq	Processed/re-packed from global sources
8	Prepared Foods / Beverages	~300–400	N/A	GCC, Africa, Asia	Juice, snacks, canned goods from 568+ processors
9	Camel Milk Products	~5–10	~500	EU, US, Asia	Premium niche; Camelicious brand exports to 20+ countries
10	Animal Feed (re-export)	~50–100	N/A	GCC	Al Dahra sourced feed redistribution

10.4 Export Challenges & Opportunities

Sanitary & Phytosanitary (SPS) Barriers	UAE exports face SPS requirements in EU (pesticide MRLs), Japan (fumigation for dates), and USA (phytosanitary certificates). MOCCAE manages compliance.
Quality Certification Bodies	ESMA (national standards), ADAFSA (Abu Dhabi food safety), Dubai Municipality, MOCCAE (export certificates)
Geographic Indication (GI) Tagged Products	No GI tags registered for UAE products as of 2025; potential for Al Ain dates, Fujairah honey
Export Promotion Agencies (Agriculture)	Abu Dhabi Exports Office; Dubai Exports (Dubai Trade); Silal (Abu Dhabi farm-to-market); MOCCAE trade division
Agricultural Export Policy	National Food Security Strategy 2051 prioritizes import diversification over export growth; no separate agricultural export promotion policy
Processing & Value Addition for Export	High – majority of agri-food exports are processed/value-added (sugar refining, juice, dairy, packaged foods)
Emerging Export Commodities	Vertical farm leafy greens (regional), premium dates (value-added: date paste, date syrup, chocolate dates), camel milk products, aquaculture fish (salmon, sea bream)

SECTION 11: COMMERCIAL & EMERGING TECHNOLOGIES IN AGRICULTURE

11.1 Digital & Precision Agriculture

Satellite / Remote Sensing for Crop Monitoring	MOCCAE uses satellite imagery for land use monitoring; DubaiSat-1/2 (MBRSC) provides national coverage; ADAFSA uses remote sensing for farm compliance
GIS-based Agricultural Planning Tools	UAESIS (UAE Soil Information System – ICBA) with 20+ digital maps; ADAFSA farm GIS registry; EAD environmental atlas
Drone Technology (UAV) for Agriculture	GCAA-regulated; used for date palm spraying (ADAFSA pilots), crop health imaging, farm mapping; ~86.5% monitoring accuracy achieved (RIT Dubai research)
AI/ML-based Crop Advisory Systems	ICBA's CHAG (launched COP29, Nov 2024) – ChatGPT-powered advisory using 50+ years of data; Pure Harvest AI-driven greenhouse management
IoT in Agriculture (Smart Sensors)	Widely deployed in vertical farms and greenhouses; soil moisture, EC, pH, temperature, humidity sensors; automated fertigation systems
Blockchain for Agri Supply Chain	Pilot stage – IBM Food Trust tested in UAE; date palm traceability pilots; silal digital supply chain platform
Mobile-based Farmer Advisory Apps	ADAFSA mobile services; MOCCAE farmer portal; limited dedicated apps vs. India's ecosystem; more emphasis on direct farm support
E-NAM / Digital Commodity Markets	Agriota digital platform (DMCC) connects Indian farmers to UAE food companies; no domestic equivalent of India's e-NAM

11.2 Biotechnology & Crop Improvement

GM/GMO Crop Status	GMO food products permitted for import with mandatory labeling (GCC-wide regulation); no domestic GM crop cultivation approved; ICBA researches gene-edited salt-tolerant varieties
National Biotechnology Policy	No standalone biotech agriculture policy; regulation through MOCCAE food safety standards and GCC Standardization Organization
Hybrid Seed Development & Adoption	All commercial vegetable seeds imported (mainly from Netherlands, Japan, USA); no domestic seed breeding industry
Tissue Culture Technology	Active – date palm tissue culture labs in Abu Dhabi (Date Palm Research Centre); producing disease-free offshoots of premium varieties
Marker-Assisted Selection (MAS)	ICBA conducts MAS for salt-tolerant quinoa and barley; UAE University (UAEU) plant genetics research
Gene Editing / CRISPR Status	Research stage at ICBA and UAEU; no commercial deployment; regulatory framework under development
Biofertilizer Production & Use	Growing interest; ADAFSA promotes microbial inoculants; no large-scale domestic production
Biopesticide Production & Use	Imported products registered by MOCCAE; Bt, Trichoderma, neem products approved; domestic production minimal

11.3 Protected Cultivation & Controlled Environment

Greenhouse / Polyhouse Area	~2,000–3,000 ha (est. total protected agriculture area); market >$240M (2023); Abu Dhabi = 60% of capacity
Shade Net House Area	~500–1,000 ha (est.); used for date nurseries, ornamental production

Hydroponic Farming	87 commercial hydroponic farms operational; Bustanica (330,000 sq ft – world's largest vertical farm); Madar Farms; Badia Farms
Vertical Farming / Urban Agriculture	Major sector: Bustanica (1M+ kg leafy greens/year), Pure Harvest ($287M+ funded), Madar Farms (IGS Growth Towers), ReFarm (3,000+ t/yr planned); 36% of UAE agtech companies focus on indoor farming
Net House / Screen House Cultivation	~200–500 ha (est.); used for vegetable production in less extreme conditions
Low-cost Plastic Mulching Area	~5,000–10,000 ha (est.); used in open-field date and vegetable farming

11.4 Post-Harvest & Agro-Processing Technology

Cold Storage Capacity & Technology	World-class: JAFZA food cluster (92,100 m² warehouse + cold storage); multiple commercial cold chain operators; Dubai is a global cold chain logistics hub
Controlled Atmosphere (CA) Storage	Used by major retailers and food distributors (Carrefour, Spinneys, LuLu supply chains); date storage facilities in Al Ain
Irradiation Technology	Not widely deployed for domestic produce; imported items may be irradiated per source country standards
Food Processing Technology Clusters	JAFZA (9,500+ companies), KIZAD food zone, Food Tech Valley (Dubai), Sharjah Food Park, Abu Dhabi Industrial City
Packaging Innovation	Advanced – modified atmosphere, vacuum, aseptic, smart labels; 568+ food processors; Al Khaleej Sugar (24,000 MT/day)
Traceability Systems	Silal supply chain platform; ADAFSA farm-to-fork traceability; barcode/QR-based systems in retail; blockchain pilots

11.5 Agricultural Mechanisation Technologies

Advanced Combine Harvesters	Not applicable at scale (minimal cereal production)
GPS-guided Tractors & Implements	Limited to large corporate farms (Al Dahra, Elite Agro); growing adoption with EDB financing
Automated Transplanting Machines	Used in greenhouse operations; robotic seeding in vertical farms (Bustanica, Madar)
Laser Land Levelling Adoption	Not applicable – relevance limited in sandy desert conditions
Solar Pumps for Irrigation	Government subsidizes 30–50% of solar-powered desalination units and pumps; growing adoption; >1,000 units (est.)
Fertigation Technology	~70–80% of irrigated area uses fertigation; mandatory for new farm establishments under ADAFSA regulations

11.6 Major Agricultural Innovations in UAE and Their Relevance for India

Innovation / Technology	Sector	Description	Potential Application in India	Expected Impact in India
Bustanica Vertical Farming	Controlled Environment	World's largest indoor vertical farm; 330,000 sq ft; 95% water saving	Urban food production in Delhi, Mumbai, Bangalore metro areas	Reduce vegetable transport costs; year-round supply; reduce pesticide use

Innovation / Technology	Sector	Description	Potential Application in India	Expected Impact in India
ICBA Salt-Tolerant Crops	Crop Science	Quinoa, Salicornia, barley varieties for saline conditions; 15,000+ accessions	Rajasthan, Gujarat, Maharashtra saline coastal soils (6.73 M ha)	Reclaim unproductive saline lands; diversify food crops; improve nutrition
Desert Control LNC	Soil Technology	Liquid NanoClay transforms sand to fertile soil in 7 hours; 47–62% water saving	Rajasthan Thar desert; Gujarat Rann of Kutch; any sandy degraded soils	Transform 4.4M ha of sandy desert; reduce irrigation demand by 50%
Pure Harvest Smart Greenhouses	Protected Cultivation	AI-managed climate control; 10–15x yield vs. open field; heat-resilient design	Arid zones: Rajasthan, Andhra Pradesh, Telangana; peri-urban farms	Premium crop production in extreme heat; water-efficient farming
Camelicious Dairy Technology	Livestock	Selective breeding, automated milking, cold chain for camel dairy	Rajasthan, Gujarat, Haryana (India has ~0.25M camels)	Value-add to Indian camel population; new export product; nutrition
Fish Farm LLC RAS	Aquaculture	Recirculating aquaculture – salmon, sea bass production in desert	Landlocked Indian states; urban aquaculture; cold water fish in plains	Diversify aquaculture beyond ponds; reduce wild catch pressure
Solar Desalination for Farms	Water Technology	Govt-subsidized solar-powered desalination for individual farms	Coastal Gujarat, Tamil Nadu, Andhra Pradesh (saline groundwater zones)	Convert brackish water to irrigation; reduce groundwater depletion
ICBA CHAG AI Advisory	Digital Agriculture	ChatGPT-powered tool using 50+ years of ICBA research data	National integration with ICAR's KVK system for farmer advisory	Personalized crop recommendations for saline/arid conditions

SECTION 12: AGRICULTURAL PRODUCE, FOOD SECURITY & NUTRITION

12.1 Total Agricultural Production Overview

Total Food Grain Production	~0.023 million tonnes/year (2023, FAO) – negligible
Total Oilseed Production	Nil (no domestic production)
Total Horticulture Production	~594,480 MT/year (vegetables 233,009 MT + fruits 361,471 MT; FAO 2020)
Total Sugar Crop Production	Nil (no domestic production; Al Khaleej refines imported raw sugar)
Total Fibre Crop Production	Nil
Total Plantation Crop Production	Nil (no tea, coffee, rubber, coconut)
Self-sufficiency Ratio (food grains)	~1–2% (essentially zero for cereals; UAE imports 1.7M MT wheat/year)
Food Import Dependency (staples)	85–90% of total food consumption imported (USDA-FAS, Atlantic Council, UAE govt. consistent)
Strategic Food Reserves	Managed federally; National Food Basket of 18 staple categories with 3–5 alternative sources each; Abu Dhabi Grain Terminal at Khalifa Port; specific reserve volumes classified
Public Distribution System / Food Safety Net	No PDS equivalent (UAE is high-income); UAE Food Bank (est. 2017 – first in MENA); Ne'ma initiative (national food waste reduction); Zakat/charitable food distribution during Ramadan

12.2 Nutrition & Food Security Status

Global Food Security Index Rank	23rd globally (2022, EIU) – improved from 35th (2021); target: 1st by 2051
Global Hunger Index (GHI) Score	Not separately ranked (UAE is classified as high-income; GHI focuses on developing nations)
Undernourishment Prevalence	<2.5% (FAO estimate – below measurable threshold)
Stunting Prevalence (children <5)	Data limited; estimated <5% (well below global developing nation average)
Wasting Prevalence (children <5)	Data limited; estimated <5%
Obesity Prevalence (adults)	~31–44% (WHO age-standardized: 44.2% women, 30.9% men); among highest globally; linked to diabetes (16–18.7% prevalence)
Dietary Energy Supply	~3,200–3,500 kcal/person/day (est.; well above 2,100 kcal minimum)
Protein Supply	~90–110 g/person/day (est.; high meat/dairy/fish consumption)
Food Loss & Waste (% of production)	~1.0 million tonnes/year of food wasted (est.); Ne'ma initiative targeting 50% reduction by 2030; 44% waste reduction achieved in pilot canteens

12.3 Agricultural Input Sector

Total Chemical Fertiliser Consumption	~80,000–120,000 MT of nutrients/year (est.); predominantly imported NPK compounds
NPK Consumption Ratio	Data not separately published; emphasis on balanced fertigation in modern farms
Fertiliser Self-sufficiency	Very low – no domestic fertilizer manufacturing at scale; all imported; government subsidizes 50% of cost for UAE national farmers

Total Pesticide Consumption	Low by global standards; ~200–400 MT of technical grade/year (est.); declining with IPM adoption
Certified Seed Replacement Rate	100% for commercial vegetable farming (all seeds imported – Netherlands, Japan, USA); date palms: tissue culture offshoots replacing traditional propagation
Public Sector Seed Production	Date Palm Research Centre (Abu Dhabi) produces tissue culture plants; no public sector vegetable/cereal seed production
Private Sector Seed Market Share	100% – all vegetable/field crop seeds are private sector imports
Agricultural Credit Disbursement	Emirates Development Bank (EDB): AED 100M AgriTech financing program; Abu Dhabi Investment Office: $100M for 4 agtech companies + $272M agtech fund; Khalifa Fund for Enterprise Development provides farm loans
Agricultural Insurance Coverage	No formal national agricultural insurance scheme; government absorbs risk through subsidies and support programs

SECTION 13: KNOWLEDGE EXCHANGE – BEST PRACTICES & LEARNING OPPORTUNITIES

13.1 Signature Agricultural Achievements of the UAE

WHAT THE UAE CAN OFFER TO OTHERS:

#	Achievement / Innovation	Description and Proven Impact
1	Controlled-Environment Agriculture (CEA) at Scale	Bustanica (world's largest vertical farm, 1M+ kg/year); Pure Harvest ($287M+); 87 hydroponic farms. Proven 95% water saving and 10–15x yield improvement.
2	Biosaline Agriculture Research (ICBA)	15,000+ accessions of 270+ species; 5 quinoa lines for extreme conditions; Salicornia biofuel from seawater; CHAG AI advisory. Adopted in 10+ countries.
3	National Food Security Strategy Model	Comprehensive framework: 18-item food basket, 3–5 sources per commodity, GFSI ranking improved 35th→23rd. Replicable model for import-dependent nations.
4	Desert Soil Remediation Technology	Desert Control LNC (verified by ICBA): 47–62% water saving, 17–62% yield increase. Transforms sand to productive soil in 7 hours at $2–5/m².
5	World-Class Food Trade Logistics	JAFZA food cluster ($190B trade, 9,500 companies); cold chain infrastructure; Dubai as global food re-export hub handling 75% of shipping volume.
6	Camel Dairy Industrialization	Camelicious: world's first commercial camel dairy; 8,000+ camels; exports to 20+ countries. Cloning technology; robotic racing jockeys.
7	Solar Desalination for Agriculture	Govt-subsidized solar-powered desalination for individual farms; 30–50% capital cost subsidy; converting saline/brackish water to irrigation.
8	Cloud Seeding Programme	~300 missions/year using ground-based nano-material flares and drones; measurable rainfall enhancement in target areas.
9	Hydroponic Farming Systems	Soil-less cultivation using nutrient-rich water solutions in controlled environments
10	Vertical Farming	Multi-layer indoor farming using LED lighting and climate control can help in Efficient land use and year-round vegetable supply

13.2 Areas Where the UAE Can Learn from Other BRICS Nations

WHAT THE UAE CAN ADOPT FROM OTHERS:

#	Learning Area	Country to learn from	Description of the Gap and Opportunity
1	Traditional Water Harvesting	India	India's johad, tanka, stepwell systems (Rajasthan) offer low-cost rainwater capture methods applicable to UAE's 78 mm annual rainfall. Could supplement dam-based recharge.
2	Crop Diversity & Variety Development	India, China, Brazil	UAE grows <20 commercial crop species; India's ICAR manages 40+ crops with 1,000+ varieties. Germplasm exchange for heat/salt tolerance.
3	Organic Farming at Scale	India, Brazil	UAE has ~5,419 ha organic; India has ~4.7M ha organic certified, 44.3M ha total. Organic certification systems and farmer training models.
4	Smallholder Support & Cooperatives	India, China	India's 10,000+ Farmer Producer Organizations (FPOs) and china's cooperative farming model can help organize UAE's small farms.
5	Tropical Fruit & Spice Cultivation	India, Brazil	UAE imports 100% of spices and tropical fruits; India's expertise in mango, spice, and medicinal plant cultivation could expand UAE mountain agriculture.

#	Learning Area	Country to learn from	Description of the Gap and Opportunity
6	Large-Scale Livestock Genetics	Brazil, India	Brazil's Nelore/Zebu tropical cattle breeding and India's buffalo dairy genetics could improve UAE's dairy herd heat tolerance.
7	Aquaculture Intensification	China, India	China Produces 60% of world aquaculture; India is 3rd in acquaculture production. UAE's 3,526 MT aquaculture could learn species diversification, pond management.
8	Agricultural Extension Services	India	India's KVK (Krishi Vigyan Kendra) network of 731 centres provides structured farmer-facing extension. UAE lacks equivalent systematic outreach.

13.3 Agro-Climatic Matching – UAE-India Region Pairs

UAE regions are mapped to analogous Indian states across agro-climatic parameters for targeted technology transfer.

UAE Region	India State	Climate Match	Soil Match	Key Crops	Rainfall	Priority Technology Transfer
Al Ain Oasis	Rajasthan (Jodhpur/Jaisalmer)	Hot arid desert	Sandy aridisols	Dates, fodder	78 vs. 100–400 mm	Solar desalination; date palm varieties; smart irrigation
Liwa / Al Dhafra	Rajasthan (Thar Desert)	Hyper-arid	Deep sand, <50 mm rain	Date palms only	<50 vs. <200 mm	Desert Control LNC; Salicornia cultivation
Fujairah Mountains	Kerala / Western Ghats (lower elevations)	Subtropical, higher rainfall	Laterite/alluvium	Fruits, vegetables, spices	150–350 vs. 2,000+ mm	Terrace farming; water harvesting; organic methods
Coastal Abu Dhabi	Gujarat (Kutch coast)	Hot arid, saline coast	Saline/sabkha	Protected veg, fisheries	<100 vs. 300–400 mm	ICBA salt-tolerant crops; mangrove restoration; shrimp aquaculture
Dubai Urban	Delhi/Mumbai Metro	Urban heat island	Not soil-dependent	Vertical farm greens	Variable	Bustanica-model vertical farms; AI-driven hydroponics
RAK Digdaga	Maharashtra (Marathwada)	Semi-arid, seasonal	Sandy loam/alluvial	Vegetables, onions	~100 vs. 500–750 mm	Drip irrigation; greenhouse tech; IPM
Sharjah Mleiha	Madhya Pradesh (Malwa)	Semi-arid continental	Alluvial/sandy	Wheat (experimental)	~80 vs. 800–1,000 mm	Heat-tolerant wheat varieties; precision agriculture
Abu Dhabi Offshore	Gujarat/Maharashtra Coast	Tropical marine	N/A (marine)	Fisheries, aquaculture	N/A	RAS aquaculture technology; sustainable fisheries management

SECTION 14: REFERENCES, DATA SOURCES & ANNEXURES

14.1 Primary Data Sources

National Statistics Office	Federal Competitiveness and Statistics Centre (FCSA) – National Census 2020; Statistical Yearbook. URL: fcsc.gov.ae
Ministry of Agriculture / Environment	Ministry of Climate Change and Environment (MOCCAE) – Agricultural statistics, fisheries data, pesticide regulations. URL: moccae.gov.ae
Abu Dhabi Agriculture Authority	Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) – Farm registry, food safety, organic certification. URL: adafsa.gov.ae
UAE Government Portal	Official UAE Government Platform – National strategies, fact sheets, policy documents. URL: u.ae
FAO-STAT Database	FAOSTAT production, trade, and food balance sheets for UAE. URL: faostat.fao.org. Access: 2024–2025.
World Bank WDI	World Development Indicators – GDP, population, arable land, agricultural value added. URL: data.worldbank.org
USDA FAS Database	USDA Foreign Agricultural Service (Dubai office) – Exporter Guide Annual, Food Processing Ingredients Annual, Grain and Feed Annual, Poultry Annual. URL: fas.usda.gov
International Center for Biosaline Agriculture	ICBA – Soil mapping (UAESIS), salt-tolerant crop research, CHAG AI tool, halophyte studies. URL: biosaline.org
Emirates Soil Museum	Operated by ICBA – UAE soil classification, digital maps, soil series data. URL: emiratessoilmuseum.org
Environment Agency Abu Dhabi (EAD)	Environmental Atlas, soil protection policy, biodiversity monitoring. URL: ead.gov.ae
National Centre of Meteorology (NCM)	Rainfall, temperature, climate data, cloud seeding program. URL: ncm.ae
IMF World Economic Outlook	GDP, GDP per capita, population estimates (2025). URL: imf.org/weo
UNDP Human Development Reports	HDI ranking and score. URL: hdr.undp.org
EIU Global Food Security Index	GFSI rankings for UAE. URL: impact.economist.com/sustainability/project/food-security-index
USDA-FAS Dubai Post Reports	Multiple reports: TC2024-0003, TC2024-0004, TC2025-0005. URL: fas.usda.gov/newgainapi
European Commission	Agri-food profile: UAE (2023). URL: agriculture.ec.europa.eu
India MoFPI	UAE Country Profile for Food Processing. URL: mofpi.gov.in
WAM (Emirates News Agency)	Official UAE news source for government statistics and announcements. URL: wam.ae
Peer-reviewed Journals	Frontiers in Sustainable Food Systems (date palm salinity study, 2023); Applied Water Science (Springer, 2016); Journal of Experimental Biology and Agricultural Sciences (2017)

14.2 Glossary of Key Terms

Term	Definition
Agro-Climatic Zone	A region classified by climate, rainfall, temperature, and soil determining agricultural potential
CEPA	Comprehensive Economic Partnership Agreement – India-UAE bilateral trade agreement effective May 2022
CEA	Controlled Environment Agriculture – farming in enclosed structures with managed climate conditions
Cropping Intensity	Ratio of gross cropped area to net sown area, expressed as percentage; indicates multiple cropping
EEZ	Exclusive Economic Zone – sea zone for sovereign rights over marine resources
FCSA	Federal Competitiveness and Statistics Centre (now Authority) – UAE's national statistics body
Falaj	Traditional irrigation channel system used in Al Ain oases; UNESCO World Heritage listed
GAP	Good Agricultural Practices – on-farm standards for safe and sustainable food production
GDD	Growing Degree Days – heat accumulation measure for crop development prediction
GFSI	Global Food Security Index – EIU-published ranking of national food security
GHI	Global Hunger Index – composite measure of hunger (not applied to high-income UAE)
Halophyte	Plant species tolerant of high salinity – key to UAE's agricultural future (e.g., Salicornia)
ICBA	International Center for Biosaline Agriculture – Dubai-based research organization
IPM	Integrated Pest Management – ecosystem-based pest prevention strategy
LNC	Liquid NanoClay – Desert Control technology for sandy soil improvement
MOCCAE	Ministry of Climate Change and Environment – UAE federal agriculture/environment ministry
NDB	New Development Bank – BRICS multilateral development bank
RAS	Recirculating Aquaculture Systems – indoor fish farming with water recycling
Sabkha	Salt-encrusted flat coastal or inland depression – major soil type in UAE
SPS	Sanitary and Phytosanitary measures – food safety and plant health trade standards
TFP	Total Factor Productivity – efficiency measure relative to all inputs
UAESIS	UAE Soil Information System – ICBA-managed digital soil database