

SECTION 1: COUNTRY OVERVIEW & GEOGRAPHIC PROFILE

1.1 Basic Country Information

Country Name	Arab Republic of Egypt
Capital City	Cairo (Al-Qahira)
BRICS Status	Extended Member – Joined January 2024
Total Population	107.3 million (2024, CAPMAS); 116.5 million (2024 UN estimate)
Population Growth Rate	1.3% per annum (2024, World Bank)
Rural Population (%)	57.2% of total (2024, CAPMAS – 61.4 million in rural areas)
Urban Population (%)	42.8% of total (2024, CAPMAS – 45.9 million in urban areas)
GDP (Nominal)	USD 383-389 Billion (2024 est., IMF/World Bank)
GDP per Capita	USD 3,698 (2024 est., IMF)
Agriculture's Share of GDP	11.1% (2023, World Bank); 13.71% (2024, World Bank revised)
Agriculture's Share of Employment	18.7% of total workforce – 5.594 million workers (2024, CAPMAS Labour Force Survey)
HDI Rank	105th globally; Score: 0.731 (2024 UNDP Human Development Report)
Official Language(s)	Arabic (official); English and French used in business/education
Currency	Egyptian Pound (EGP); floating exchange rate (~EGP 50.5/USD as of early 2025)

1.2 Geographic Coordinates & Physical Extent

Total Geographic Area	1,001,450 km ² – Rank 30th in world
Northernmost Latitude	31°36' N (Mediterranean coast near Rafah)
Southernmost Latitude	22°00' N (Sudan border at Wadi Halfa salient)
Easternmost Longitude	36°54' E (Ras Hadarba, Red Sea coast)
Westernmost Longitude	24°42' E (Libya border)
Geographic Centre (approx.)	26°49' N, 30°48' E (Western Desert, south of Faiyum)
Total Coastline Length	2,450 km (Mediterranean ~995 km + Red Sea ~1,455 km)
Land Border Length	2,612 km (Libya 1,115 km; Sudan 1,276 km; Israel/Palestine 221 km)
Number of Bordering Countries	3 – Libya (west), Sudan (south), Israel/Palestine (east/northeast)
Highest Elevation Point	Mount Catherine (Jabal Katrina), 2,629 m – Sinai Peninsula
Lowest Elevation Point	Qattara Depression, –133 m below sea level (Western Desert)
Major River Systems	Nile River – ~1,550 km within Egypt (world's longest river system ~6,650 km total); no other permanent rivers
Major Lakes	Lake Nasser (5,250 km ² , largest artificial lake in Africa); Lake Manzala (~700 km ²); Lake Burullus (~420 km ²); Lake Mariut; Lake Qarun (~230 km ²)

1.3 Administrative Divisions Relevant to Agriculture

Egypt is divided into 27 governorates, with agriculture concentrated in the Nile Valley and Delta regions. The Ministry of Agriculture and Land Reclamation (MALR) is the primary federal authority for agricultural policy, supported by CAPMAS for statistics.

Primary Division (Governorates)	27 Governorates – 9 Upper Egypt, 9 Lower Egypt (Delta), 5 Frontier, 4 Urban
Secondary Division (Markaz/Districts)	~353 Markaz (rural districts) plus ~235 urban districts
Tertiary Division (Villages)	~4,741 main villages (CAPMAS) with ~30,888 satellite villages ('ezab/kafr)
Lowest Agricultural Planning Unit	Village level (qarya) – registered with MALR district agricultural directorate
Special Agricultural Zones	Nile Delta (4.8M feddans, 63.8% of cultivated area); Upper Egypt (2.3M feddans, 30%); New Lands: 1.5 Million Feddan Project (desert reclamation); Toshka/New Valley; East Oweinat; Sinai Peninsula Development
Agricultural Development Regions	El-Delta Sugar Company zone; East Oweinat agri-industrial hub; New Administrative Capital food processing zone; 100,000 Greenhouse Project; Mostakbal Masr ('Future of Egypt') mega-farm project (~500,000 feddans)

SECTION 2: AGRO-CLIMATIC ZONES & CLASSIFICATION

2.1 National Agro-Climatic Zone Classification System

Classification System Used	FAO / National system based on soil characteristics and water resources – 4 major agro-ecological zones identified
Total Number of Agro-Climatic Zones	4 (Nile Valley & Delta Old Lands, New Reclaimed Lands, Oases, North Coastal Rain-fed Strip)
Basis of Classification	Soil type, water source (Nile irrigation / groundwater / rainfall), and land reclamation status
Reference Authority	Ministry of Agriculture and Land Reclamation (MALR); Soil, Water and Environment Research Institute (SWERI); FAO AQUASTAT

2.2 Zone-wise Detailed Description

AGRO-CLIMATIC ZONE 1 – NILE VALLEY & DELTA (OLD LANDS)

Zone Name	Nile Valley & Delta (Old Lands)
Geographic Coverage	Nile Valley from Aswan to Cairo; Nile Delta from Cairo to Mediterranean coast. Covers 14 governorates.
Area Coverage	2.25 million ha (~5.4 million feddans) – ~2.2% of national area but >60% of cultivated land
Annual Rainfall (avg.)	0–25 mm in Upper Egypt; 50–200 mm in northern Delta coast. Agriculture is 100% irrigated from Nile.
Average Temperature (Annual)	20–22°C; Delta: 14°C (Jan) to 35°C (Jul); Upper Egypt: 8°C (Jan night) to 42°C (Jun)
Growing Season Length	Year-round (two to three crops/year possible with irrigation)
Number of Cropping Seasons	3 seasons: Winter (Nov–Apr: wheat, berseem, faba bean); Summer (May–Oct: rice, maize, cotton); Nili (Sep–Nov: short-season vegetables)
Dominant Soil Types	Alluvial clay and clay-loam (Vertisols/Fluvisols) – highly fertile, pH 7.5–8.5, high CEC
Major Crops Grown	Wheat, maize, rice, cotton, sugarcane, berseem clover, faba beans, vegetables, citrus, mangoes
Irrigation Availability	100% irrigated from Nile via 40,000+ km canal network; flood/furrow irrigation dominant (converting to drip)
Agricultural Land Use	~90% of zone area under intensive cultivation; cropping intensity 180–200%
Key Agri. Challenges	Soil salinization, waterlogging, urban encroachment (losing ~3,108 ha/year), water scarcity, drainage
Potential / Opportunity Areas	Precision irrigation conversion, high-value horticulture for export, organic farming expansion

AGRO-CLIMATIC ZONE 2 – NEW RECLAIMED LANDS

Zone Name	New Reclaimed Lands (Desert margins)
Geographic Coverage	East and west fringes of Nile Delta; scattered desert areas across governorates; Toshka, East Oweinat

Area Coverage	~1.05 million ha (2.5 million feddans) – expanding through 1.5 Million Feddan Project
Annual Rainfall (avg.)	<25 mm/year; entirely dependent on Nile water (via canals) or groundwater (Nubian Sandstone Aquifer)
Average Temperature (Annual)	22–26°C; extreme diurnal variation in desert
Dominant Soil Types	Sandy, sandy-loam, calcareous soils – low organic matter, low water retention, pH 7.8–8.5
Major Crops Grown	Fruit orchards (citrus, grapes, mangoes, apples, bananas), vegetables for export (tomatoes, strawberries, peppers), wheat, maize
Irrigation Availability	100% irrigated – drip and sprinkler irrigation mandatory on new lands; centre-pivot in Toshka/East Oweinat
Key Agri. Challenges	High cost of land development, groundwater depletion, soil salinity build-up, energy costs for pumping
Potential / Opportunity Areas	Export-oriented horticulture, solar-powered irrigation, carbon credit farming, agri-business parks

AGRO-CLIMATIC ZONE 3 – OASES (WESTERN DESERT)

Zone Name	Oases (Siwa, Bahariya, Farafra, Dakhla, Kharga)
Area Coverage	~40,000 ha (FAO); ~0.04% of national area
Annual Rainfall (avg.)	<5 mm/year; Siwa: 9 mm; entirely groundwater-dependent (Nubian Aquifer)
Dominant Soil Types	Alluvial, sandy and calcareous; moderate fertility in oasis centres
Major Crops Grown	Date palms (primary), olives, vegetables, rice (Siwa), medicinal plants
Key Agri. Challenges	Groundwater depletion, salinity, remoteness, limited market access, waterlogging in some oases

AGRO-CLIMATIC ZONE 4 – NORTH COASTAL RAIN-FED STRIP

Zone Name	North Coastal Rain-fed Strip (Mediterranean)
Area Coverage	~170,000 ha along Mediterranean coast; only rain-fed agriculture in Egypt
Annual Rainfall (avg.)	100–200 mm/year; highly variable; concentrated Nov–Mar
Dominant Soil Types	Sandy and calcareous coastal soils; moderate salinity
Major Crops Grown	Barley, figs, olives, some seasonal vegetables; pastoral grazing (sheep/goats)
Key Agri. Challenges	Rainfall variability, overgrazing, desertification, limited water harvesting

SECTION 3: CLIMATE, RAINFALL & TEMPERATURE EFFECTS ON AGRICULTURE

3.1 Overall Climate Classification

Köppen Climate Classification	BWh (Hot Desert) dominates >90% of territory; BSh (Hot Semi-Arid) along Mediterranean coast; small Csa (Mediterranean) pockets in north
Dominant Climate Type	Hyper-Arid / Hot Desert – agriculture is almost 100% dependent on Nile irrigation
Monsoon Season	Not applicable – no monsoon system affects Egypt
Number of Distinct Seasons	2 – Hot dry Summer (May–October) and Mild dry Winter (November–April); Khamsin hot winds in spring (Mar–May)

3.2 Rainfall Pattern & Agricultural Implications

National Average Annual Rainfall	~51 mm/year (FAO AQUASTAT) – among the lowest globally
Highest Rainfall Zone	North Mediterranean coast (Alexandria/Marsa Matruh) – 150–200 mm/year
Lowest Rainfall Zone	Upper Egypt and Western Desert – <5 mm/year; effectively zero
Rainfall Distribution Pattern	Highly seasonal (Nov–Mar on coast); virtually zero elsewhere – agriculture is Nile-dependent, NOT rainfall-dependent
Drought-prone Areas	Entire country is arid; North coast rain-fed strip vulnerable to drought; GERD reduces Nile flow
Flood-prone Areas	Flash floods in Sinai wadis, Red Sea mountains, and Aswan region; occasional Nile Delta flooding from heavy Mediterranean rains
Average Rainy Days per Year	10–20 days on Mediterranean coast; 0–5 days in Upper Egypt
Groundwater Recharge Rate	Natural recharge ~7.5 BCM/year (Nile seepage + rainfall); Nubian Aquifer is fossil (non-renewable)

3.3 Temperature Effects on Agricultural Production

Mean Annual Temperature	21–22°C nationally; 20°C in Delta, 25°C in Upper Egypt
Hottest Month & Temperature	June–August: avg. 28–34°C; absolute max 50°C+ in Aswan/Luxor
Coldest Month & Temperature	January: avg. 10–14°C in Delta; min 2–5°C; frost rare but damaging in northern Delta
Frost Occurrence Zones	Occasional in northern Delta (Jan–Feb); damages vegetable and citrus crops when it occurs
Heat Stress Threshold Crops	Wheat (yield declines >30°C during grain filling); rice (reduced spikelet fertility >35°C); vegetables vulnerable above 38°C
Chilling Requirement Crops	Temperate fruits (apples, pears, cherries) grown in Sinai/Northern Egypt where sufficient chill hours available
Growing Degree Days (GDD)	~5,500–6,500 GDD annually (base 10°C) – sufficient for 2–3 crop cycles/year
Temperature Trend (last 30 yrs)	+0.2°C to +0.4°C per decade (Egyptian Meteorological Authority); accelerating

3.4 Climate Change Impact on Agriculture

Observed Climate Anomalies	Rising temperatures; increasing frequency of heat waves and Khamsin storms; Mediterranean sea-level rise threatening Delta (25% of farmland <2 m above sea level)
Projected Temperature Rise by 2050	+1.5°C to +3.0°C above 1990 baseline (IPCC AR6/Egypt's Third National Communication)
Projected Rainfall Change	Mediterranean coast: potential 10–20% decrease; Delta: increased saltwater intrusion from sea-level rise
Most Vulnerable Crops/Regions	Nile Delta (sea-level rise/salinization threatens 15–19% of most fertile land); rice (water restrictions); cotton (heat stress)
National Climate Adaptation Policy	Egypt National Climate Change Strategy 2050 (approved 2022); Egypt Vision 2030; National Adaptation Programme of Action; NDC updated 2023
Climate-Smart Agriculture Programs	USD 500M World Bank Water Resources Modernization Project (2024); IFAD USD 52.8M climate-resilient agriculture facility; 100,000 Greenhouse Project; rice-to-dryland crop conversion program

3.5 Climate-Resilient Agriculture and Climate Action

Initiative / Technology	Implementing Institution	Description	Impact / Benefit
USD 500M Irrigation Modernization	World Bank / MALR	Converting 500,000 feddans from flood to drip/sprinkler irrigation in Nile Delta	Up to 40% water savings; improved yields; reduced waterlogging
1.5 Million Feddan Project	National Service Projects Org.	Desert land reclamation using modern irrigation and groundwater from Nubian Aquifer	630,000+ ha of new agricultural land; rural employment for youth
100,000 Greenhouse Project	MALR / Private Sector	Construction of climate-controlled greenhouses for year-round vegetable/fruit production	Increased productivity 10–15x vs. open field; export-quality produce
Rice Area Reduction Policy	MALR / MWRI	Mandatory reduction of rice cultivation area to conserve Nile water; shift to less water-intensive crops	Saved ~3–4 BCM/year of irrigation water; rice area reduced from 650,000 to ~420,000 ha target
National Climate Change Strategy 2050	Egyptian Environmental Affairs Agency	Comprehensive framework for adaptation across agriculture, water, coastal zones, and health	Integrated climate mainstreaming into development planning
Solar-Powered Irrigation	Various / Benban Solar Park	Egypt has Africa's largest solar park (1.8 GW); solar pumps replacing diesel for irrigation	Reduced energy costs; lower emissions; reliable water access

SECTION 4: CROPPING PATTERNS & AGRICULTURAL CALENDAR

4.1 Seasonal Cropping System

Season Name	Local Name	Months	Regions Covered	Major Crops
Winter (Primary)	Shitawi	Nov–Apr	All irrigated areas	Wheat, berseem clover, faba beans, barley, flax, sugar beet, lentils, onions, garlic, potatoes
Summer	Saifi	May–Oct	All irrigated areas	Rice, maize, cotton, sugarcane, sorghum, soybean, sesame, sunflower, peanuts, tomatoes
Nili (Autumn)	Nili	Sep–Nov	Delta and Middle Egypt	Short-season vegetables (tomatoes, peppers, eggplant), maize (second crop), berseem early planting
Perennial / Year-round	—	Jan–Dec	All zones	Sugarcane (ratoon), fruit orchards (citrus, mangoes, grapes, dates, bananas), alfalfa

4.2 Major Food Crops

Staple Cereals	Wheat: ~9.3 MT (2025-26 USDA est.); 1.26M ha. Maize: ~7.25 MT; ~0.88M ha. Rice: ~4.0–4.8 MT (paddy); ~420,000–500,000 ha (area restricted for water conservation). Barley: ~130,000 MT; ~50,000 ha. Sorghum: ~0.8 MT; ~150,000 ha.
Pulses / Legumes	Faba beans (ful medames – national staple): ~180,000 MT; ~50,000 ha. Lentils: ~5,000 MT. Egypt is a major importer of pulses.
Oilseeds	Soybean (limited): ~25,000 MT. Peanuts: ~200,000 MT; ~60,000 ha. Sunflower: ~30,000 MT. Sesame: ~45,000 MT. Egypt imports >95% of edible oil needs.
Root & Tuber Crops	Potatoes: ~5.5 MT; ~180,000 ha (major export crop). Sweet potatoes: ~387,000 MT exported in 2025. Onions: ~3.2 MT; ~80,000 ha.
Vegetables (Major)	Tomatoes: ~6.5–7.5 MT (world's 5th largest producer); Potatoes: ~5.5 MT; Onions: ~3.2 MT; Peppers: ~1.0 MT; Cucumbers, Eggplant, Watermelons, Peas
Fruits (Major)	Oranges: ~3.8 MT (world's largest exporter for 6th year); Grapes: ~1.8 MT; Mangoes: ~1.0 MT; Dates: ~1.7 MT; Strawberries: ~0.7 MT; Bananas: ~1.3 MT; Guavas, Pomegranates, Figs
Plantation Crops	Not applicable – no tea, coffee, rubber. Limited olive oil production (~40,000 MT).
Spices & Condiments	Cumin, anise, fennel, coriander, caraway grown in Upper Egypt – significant export items
Flowers & Ornamentals	Growing sector; exported to EU; concentrated in Alexandria and New Lands
Medicinal & Aromatic Plants	Major sector: chamomile, peppermint, basil, marjoram, hibiscus (karkade). Egypt is among world's top 5 exporters of medicinal herbs.

4.3 Cash Crops & Industrial Crops

Major Cash Crops	Cotton (Egyptian long-staple – historically 'white gold'): ~100,000 MT lint; ~100,000 ha (declining from 900,000 ha peak). Sugarcane: ~16 MT;
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Industrial Crops	~140,000 ha (Upper Egypt). Sugar beet: ~13 MT; ~250,000 ha (Delta). Rice (export restricted). Citrus (major export).
Bioenergy Crops	Cotton (textile industry), sugarcane/sugar beet (sugar refining), flax (linen), soybean (crushing)
Fibre Crops	Cotton (Egyptian extra-long staple: Giza 45, Giza 92, Giza 96 – world’s finest cotton); Flax (~15,000 MT)
Beverage Crops	Not produced commercially (no tea/coffee); hibiscus (karkade) is a traditional beverage crop

4.4 Cropping Intensity & Productivity

Cropping Intensity (national avg.)	~180–200% (Old Lands average 2 crops/year; some areas achieve 3 crops/year with Nili season)
Average Crop Yield – Cereals	Wheat: ~6.7 t/ha; Maize: ~7.2 t/ha; Rice: ~9.5–10.0 t/ha (among world’s highest; FAO AQUASTAT)
Average Crop Yield – Pulses	Faba beans: ~3.4 t/ha
Average Crop Yield – Oilseeds	Peanuts: ~3.3 t/ha; Soybean: ~3.4 t/ha
Total Food Grain Production	~21–23 million tonnes/year (wheat + maize + rice + sorghum + barley)
Total Horticulture Production	~25–30 million tonnes/year (vegetables + fruits; Egypt is among top 10 global producers)

4.5 Major Crop Varieties and Yield/ha

Crop	Important Varieties (Egypt)	Average Yield (t/ha)	Notes
Wheat	Giza 171, Misr 1, Misr 3, Sids 14, Gemmiza 12 (MALR/ARC)	6.5–6.8	1.26M ha; world’s largest importer (~13 MT imports)
Maize	SC hybrids: SC 10, SC 128, SC 168, TWC 321, TWC 352	7.0–7.5	~70% area under hybrids; summer crop
Rice	Giza 177, Giza 178, Sakha 101, Sakha 104 (short-duration)	9.5–10.0	Among world’s highest yields; area restricted for water
Cotton	Giza 45, Giza 92, Giza 96 (extra-long staple); Giza 94, Giza 95 (long staple)	0.8–1.0 (lint)	Declining area; premium quality; Giza 45 commands 3–5x global average price
Sugarcane	GT 54-9, NCo 310, C 9, Phil 8013, G 2003-49 (Sugar Crops Research Inst.)	115–125	Upper Egypt; 12–18 month ratoon cycles
Oranges	Navel, Valencia, Baladi, Blood orange (Moro, Tarocco)	20–25	3.8 MT production; world’s #1 exporter; 6 consecutive years
Potatoes	Spunta, Diamant, Nicola, Hermes, Lady Rosetta	25–30	5.5 MT production; 3 seasons possible; major export crop
Tomatoes	Hybrid F1: GS-12, Super Strain B, Carmen, 010	30–40 (open field)	6.5–7.5 MT; 3 seasons; world’s 5th largest producer
Grapes	Thompson Seedless, Flame Seedless, Superior, Crimson	10–15	1.8 MT production; expanding rapidly in New Lands
Dates	Siwa, Amhat, Siwi, Hayani, Zaghloul, Samani, Barhi, Medjool	7.5–8.5	~1.7 MT; 15–16 million trees; Upper Egypt and oases

SECTION 5: AGRICULTURAL LAND USE & LAND RESOURCES

5.1 Land Use Classification

Total Geographic Area	1,001,450 km ² (100.14 million ha)
Total Agricultural Land	~4 million ha (10.44 million feddans – CAPMAS 2023); ~4.4% of total area
Net Sown Area	~3.4 million ha (arable land; World Bank 2023) – ~3.5% of total area
Gross Cropped Area	~6.2–6.5 million ha (reflecting cropping intensity of ~180–200%)
Area under Forests	~73,000 ha (0.07% of total; primarily planted forests and tree plantations; FAO 2020)
Permanent Pastures & Grazing Lands	Negligible – narrow strip along Mediterranean coast only (~170,000 ha)
Land under Misc. Tree Crops & Groves	~550,000 ha under permanent fruit tree orchards (citrus, mangoes, grapes, dates, olives)
Culturable Waste Land	Significant desert potential; 1.5 Million Feddan Project targets 630,000 ha reclamation
Fallow Land	~200,000–300,000 ha (limited – high pressure on land forces continuous cultivation)
Barren & Unculturable Land	~95.7 million ha (>95.5% of total area – desert, mountains, sand seas)
Non-agricultural Use	~300,000–400,000 ha (settlements, roads, industry – growing rapidly; losing ~3,108 ha/year to urbanization)

5.2 Irrigation Infrastructure

Total Irrigation Potential Created	~3.8 million ha (virtually all cultivated land is irrigable)
Total Irrigated Area	~3.8 million ha (100% of cultivated area – no significant rainfed farming except north coast)
Canal Irrigation Coverage	~40,000+ km of irrigation canals from Nile; surface/flood irrigation covers ~80% of Old Lands (converting to modern)
Groundwater Irrigation Coverage	~7.5 BCM/year from groundwater; primary source in New Lands, oases, Sinai; Nubian Sandstone Aquifer (fossil, non-renewable)
Tank / Reservoir Irrigation	Lake Nasser (164 BCM capacity; ~5,250 km ²) – Aswan High Dam impoundment; annual regulated release ~55.5 BCM
Drip Irrigation Area	~500,000+ ha (all New Lands required to use drip/sprinkler; USD 500M World Bank project converting 500,000 feddans more)
Sprinkler Irrigation Area	~200,000 ha (centre-pivot in Toshka, East Oweinat, and New Lands)
Total Annual Freshwater Withdrawal (agri)	~61.5 BCM/year; agriculture consumes ~81% of total water (~50 BCM from Nile allocation of 55.5 BCM)
Major Irrigation Projects	Aswan High Dam (completed 1970); Al-Salam Canal (Sinai); Toshka Spillway; New Valley Canal; Sheikh Zayed Canal; Bahr al-Baqar drain water treatment plant (world's largest, 5 MCM/day)
Water Use Efficiency (crop/drop)	Old Lands flood irrigation: 0.6–0.8 kg/m ³ ; New Lands drip: 1.5–2.5 kg/m ³ ; target: 40% improvement via modernization

5.3 Land Tenure & Farm Structure

Average Farm Size (national)	~0.8 ha (2 feddans) – among the world’s smallest
% Smallholder Farms (<2 ha)	~85–90% of all farms are <2 ha (fragmentation is a critical challenge)
% Medium Farms (2–10 ha)	~8–10%
% Large Farms (>10 ha)	~2–3% (including government/military mega-farms like ‘Future of Egypt’)
Dominant Land Tenure System	Owner-operated (70%); tenant farming (30%) – post-1992 liberalization of rents. Agrarian Reform laws limit individual ownership to 50 feddans (21 ha), family to 100 feddans (42 ha).
Land Reform Status	1952 land reform redistributed large estates; 1961/1969 further reduced limits; 1992 Law 96 liberalized tenancy – market rents now apply; New Lands allocated to graduates and investors
Cadastral / Land Records System	Partially digitized; MALR maintains farm registration; Tapu (title deed) system; digital transformation underway
Women’s Land Ownership (%)	Women own ~5–6% of agricultural land; manage ~9% of farm holdings (CAPMAS); mainly widowed smallholders

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

6.1 Soil Classification System

Classification System Used	FAO-UNESCO Soil Classification; USDA Soil Taxonomy used in research
Total Number of Soil Orders Present	5 major orders: Vertisols, Fluvisols, Arenosols, Calcisols, Solonchaks
Soil Survey & Mapping Authority	Soil, Water and Environment Research Institute (SWERI) under Agricultural Research Centre (ARC); Desert Research Centre (DRC)
Coverage of Soil Survey	Old Lands: ~100% surveyed; New Lands: ~70–80% surveyed; Western Desert: partially mapped

6.2 Major Soil Types – Zone-wise

Soil Type	FAO/Local Name	Area (est.)	Zones / Regions	Key Properties	Suitable Crops
Alluvial Clay	Fluvisols/Vertisols	~2.25M ha	Nile Valley & Delta (Old Lands)	Heavy clay (>40%); high CEC; pH 7.5–8.5; moderate-high OM; excellent fertility	Wheat, maize, rice, cotton, sugarcane, vegetables – Egypt's most productive soils
Sandy Desert	Arenosols	~1.0M ha (cultivated)	New Reclaimed Lands (desert fringes)	Sandy to sandy-loam; <0.5% OM; low water retention; pH 7.8–8.5	Citrus, grapes, strawberries, potatoes (with irrigation + amendment)
Calcareous	Calcisols	~0.5M ha	North coast, western Delta fringe	High CaCO ₃ (>15%); P fixation; alkaline; moderate drainage	Olives, figs, barley, some vegetables
Saline/Sodic	Solonchaks/Solonetz	~0.9M ha (affected)	Northern Delta, lakeshores, poorly drained areas	EC >4 dS/m; high Na; poor structure; drainage issues	Salt-tolerant crops only; requires reclamation (gypsum, drainage)
Oasis Soils	Mixed Fluvisols/Arenosols	~40,000 ha	Siwa, Bahariya, Farafra, Dakhla, Kharga	Variable; alluvial in centres, sandy at margins; moderate fertility	Dates, olives, rice (Siwa), vegetables
Mountain/Wadi	Leptosols/Regosols	Scattered	Sinai, Eastern Desert wadis	Thin, rocky, gravelly; low OM; flash-flood-prone	Limited – seasonal grazing; some wadi agriculture

6.3 Soil Health Indicators & Nutrient Status

Soil Health Card Programme	No formal card system; SWERI provides soil testing; Soil Health Initiative launched under Sustainable Agriculture Strategy 2030
National Average Soil pH	7.5–8.5 (alkaline throughout – typical of arid-zone calcareous/alluvial soils)
Organic Carbon Status	Old Lands: 1.0–2.0% (moderate due to millennia of Nile silt deposition); New Lands: <0.5% (very low)
Nitrogen (N) Deficiency	Widespread in New Lands; moderate in Old Lands; heavy N fertilizer use (national avg. ~180 kg N/ha/year)

Phosphorus (P) Deficiency	Moderate to severe in calcareous soils (P fixation); adequate in Delta clays
Potassium (K) Deficiency	Emerging in intensively cropped Delta soils; K depletion increasing
Zinc (Zn) Deficiency	Common in alkaline/calcareous soils – affects 30–40% of cultivated area; critical for rice and maize
Iron (Fe) Deficiency	Localized in high-pH/calcareous soils; chlorosis in citrus and stone fruits

6.4 Soil Degradation & Conservation

Area under Soil Erosion (Wind)	Significant in New Lands and desert margins; ~3.6 million ha at moderate-severe risk
Area under Soil Erosion (Water)	Limited to Sinai wadis and Red Sea mountain slopes; ~50,000–100,000 ha
Waterlogging Affected Area	~900,000 ha in Nile Delta (poor drainage); 1.2 million ha total at various severity levels
Saline / Sodic / Alkali Soils	~0.9–1.2 million ha affected (33% of Delta soils have salinity issues); worsening due to rising groundwater and sea-level rise
Area under Desertification	Entire country is arid; agricultural land lost to desertification: ~3,108 ha/year to urbanization; National Strategy to Combat Desertification 2030 targets 80% degraded land restoration
Major Soil Conservation Programs	Bahr al-Baqar drain treatment (5 MCM/day – world’s largest); National Drainage Authority programs; gypsum application for sodic soil reclamation; laser land levelling
Annual Soil Loss Rate (avg.)	Wind erosion: 5–15 t/ha/year in exposed desert margins; Water erosion: 2–5 t/ha/year in Sinai

SECTION 7: LIVESTOCK SECTOR PROFILE

7.1 Livestock Population

Total Livestock (cattle+buffalo+sheep+goats+camels)	8.1 million heads (2024, MALR/CAPMAS) – up 6.7% from 7.6 million in 2023
Total Cattle Population	~2.8–3.0 million heads (30.8% of slaughtered livestock); breeds: Baladi, Domiati, cross-breeds with Holstein/Friesian
Buffalo Population	~3.4–3.7 million heads (Egypt’s primary dairy animal; 15.2% of slaughter); breeds: Egyptian Buffalo
Sheep Population	~5.5–6.0 million heads (Barki, Rahmani, Ossimi, Saidi breeds); primarily meat
Goat Population	~4.0–4.5 million heads (Baladi, Zaraibi, Barki breeds); dairy and meat
Pig Population	~11,000 heads (FAOSTAT 2021; minimal; Coptic community)
Poultry Population	~1.65 billion birds (2024, MALR) – including broilers, layers, ducks, geese
Equine Population	~90,000–100,000 (horses, donkeys, mules; donkeys are work animals in rural areas)
Camel Population	~150,000–200,000 heads (2.2% of slaughter; Sinai, Western Desert, Upper Egypt)
Rabbit Population	~6.8 million (2021, FAOSTAT) – significant sector; backyard and commercial
Honey Bee Colonies	~2.0–2.5 million colonies (Egypt is among top 15 honey producers globally; ~9,000 MT/year)

7.2 Livestock Production Data

Total Milk Production	6.6 million tonnes (2024, MALR) – up 15.7% from 5.7 MT in 2023; buffalo contributes ~60% of milk
Average Milk Yield (cattle)	~2,500–3,500 litres/animal/year (Baladi); 5,000–7,000 (cross-breeds/Holstein in commercial farms)
Total Meat Production (red)	754,000 tonnes (2024, MALR) – up 16% from 650,000 MT (2023). Beef: 57.3%, Buffalo: 29%, Sheep/Goat: 10.5%, Camel: 3.2%
Total Poultry Meat Production	~2.41 million tonnes (2024, MALR) – from 1.92 billion birds slaughtered
Total Egg Production	16.6 billion eggs (2024, MALR) – up 1.4% from 16.4 billion (2023)
Wool Production	~12,000–15,000 tonnes/year (coarse wool from Barki and Rahmani breeds)
Leather / Hides Production	1.49 million hides processed in public slaughterhouses (2024): 719,921 cow, 248,364 buffalo, 441,647 sheep, 14,093 goat, 62,220 camel
Honey Production	~9,000 MT/year – concentrated in Upper Egypt and Delta
Livestock Sector’s GDP Contribution	~35% of agricultural GDP (livestock + poultry + dairy combined)
Red Meat Self-sufficiency	~55–60% (2024); target: 60% by 2025/26 – deficit met by imports of live cattle (Sudan, Ethiopia) and frozen buffalo meat (India)

7.3 Livestock Production Summary

Sector	Species / Product	Major Breeds	Avg Productivity	National Production
Dairy (Buffalo Milk)	Egyptian Buffalo	Government and smallholder farms	1,500–2,000 L/lactation (~6-8 liters/day)	~3.5–4.0 MT/year (~60% of total milk)
Dairy (Cow Milk)	Baladi, Holstein cross-breeds	Large commercial + smallholder	2,500–7,000 L/year (~8-12L/day; crossbreed ~12-18 L/day)	~2.5–3.0 MT/year
Egg Production	Hy-Line, Lohmann, ISA Brown	~100M layers (commercial + backyard)	~250–280 eggs/bird/year	16.6 billion eggs (2024)
Broiler Meat	Cobb 500, Ross 308, Hubbard	~1.5B broilers slaughtered/year	~2.0–2.3 kg in 35–42 days	~2.41 MT/year (2024)
Beef	Baladi, cross-breeds, imported feeders	Feedlots + smallholder	~180–250 kg carcass	~432,000 MT (2024, 57.3% of red meat)
Buffalo Meat	Egyptian Buffalo	Smallholder + commercial	~200–300 kg carcass	~219,000 MT (2024, 29% of red meat)

SECTION 8: FISHERIES & AQUACULTURE SECTOR

8.1 Fisheries Resource Base

Total Coastline	~2,450 km (Mediterranean ~995 km + Red Sea ~1,455 km)
Continental Shelf Area	~53,000 km ² (Mediterranean: shallow; Red Sea: narrow shelf, deep water)
Major Fishing Zones	Mediterranean coast (Port Said, Damietta, Alexandria); Red Sea (Hurghada, Suez); Northern Delta lakes (Manzala, Burullus, Bardawil, Mariut, Edku); Lake Nasser; Nile River
Inland Water Bodies	~150,000 ha of northern coastal lakes; Lake Nasser ~5,250 km ² ; Nile River ~1,550 km; irrigation canals and drains
Mangrove Area	~525 ha along Red Sea coast (Safaga, Marsa Alam – small but ecologically significant)
Number of Fishing Harbours	~15 major harbours along Mediterranean and Red Sea coasts; plus inland fish landing sites

8.2 Production Statistics

Total Fish Production	~2.05 million tonnes (2023, GAFRD/USDA-FAS) – largest in Africa; 7th globally in aquaculture
Marine Capture Fisheries Production	~105,000–120,000 MT/year (declining – overfishing concerns in Mediterranean)
Inland Capture Fisheries (Lakes/River)	~300,000–350,000 MT/year (northern lakes: Manzala, Burullus primary; Lake Nasser: ~30,000 MT)
Aquaculture Production	~1.57 million MT (2023, GAFRD) – 78–80% of total production; increased 50% from 1.1 MT in 2014; LARGEST IN AFRICA
Major Aquaculture Species	Nile Tilapia (dominant – ~900,000 MT/year; world's 6th largest producer); Mullet; Carp; Sea Bass; Sea Bream; Catfish; Shrimp
Fisheries Sector GDP Contribution	~2–3% of agricultural GDP; employs ~2.4 million people directly and indirectly
Per Capita Fish Consumption	~16.7 kg/year (2023, down from 19.3 in 2021 due to inflation – 13.4% decrease)

SECTION 9: GOOD AGRICULTURAL PRACTICES & SUSTAINABLE FARMING

9.1 GAP Certification & Standards

National GAP Standard	EgyptGAP (MALR) – aligned with GlobalG.A.P. requirements; mandatory for export-grade produce
International GAP Certifications	GlobalG.A.P. (widely adopted by exporters); ISO 22000; HACCP; BRC (British Retail Consortium); Rainforest Alliance (some citrus)
Organic Farming Certification Body	MALR Centre for Organic Agriculture in Egypt (COAE); international certifiers: IMO, SGS, Control Union, Ecocert operate in Egypt
Organic Farming Area	~116,000 ha (2024, FiBL/IFOAM) – 3rd largest in Africa; significant growth from 82,000 ha in 2010
Organic Export Value	~USD 200 million/year (est.); mainly herbs, spices, citrus, cotton to EU markets

9.2 Integrated Pest Management (IPM)

National IPM Policy	National IPM Programme (MALR/ARC) – operational since 1990s; 25 IPM labs across governorates
Biological Control Adoption	Moderate (horticulture/export farms)
Pesticide Consumption	~6,000–8,000 MT active ingredient/year
Farmer Field School (FFS) Programme	Active – FAO-supported FFS in cotton, rice, and vegetables; thousands of graduates since 1990s

9.3 Post-Harvest Management Practices

Post-Harvest Loss (cereal grains)	~8% (below global average; government procurement system ensures rapid collection)
Post-Harvest Loss (fruits & vegetables)	~25% (higher than global average for developing countries; cold chain gaps)
Cold Chain Infrastructure	Growing but insufficient: ~20-30% of perishable produce handled through cold chain
Food Processing Sector	~20% of total agriculture produce processed; sugar refining (8 sugar mills for cane; 8 for beet); cotton ginning; oil extraction

9.4 Farm Mechanisation

Farm Power Availability	~1.5 kW/ha (below target of 2.0 kW/ha; mechanization gap in smallholder sector)
Tractor Density	~30-50 tractors per 1,000 ha of crop area; ~136,000 agricultural tractors (MALR/CAPMAS, 2014-2018)
Combine Harvester Availability	combine harvesters are primarily used in large-scale wheat farming systems.
Precision Agriculture Adoption	Low but Emerging: GPS-guided land levelling (laser levelling on ~500,000+ ha for water efficiency); satellite crop monitoring by MALR/ARC; drone use in pilot stage
Drone Usage	Regulatory framework developing; pilot programs for pest monitoring in cotton and rice; not yet widely commercial

SECTION 10: AGRICULTURAL EXPORT COMMODITIES & TRADE

10.1 Overall Agriculture Trade Profile

Total Agricultural Exports Value	USD 11.5 Billion (2025, MALR); up from USD 10.7 Billion (2024)
Total Agricultural Imports Value	~USD 18–20 Billion/year (est. 2024; wheat alone ~USD 4–5 Billion)
Agriculture Trade Balance	~USD 10 Billion deficit (structural – Egypt imports >50% of food needs, esp. wheat, oil, meat)
Agriculture’s Share of Total Exports	~20% of total goods exports (~USD 45 Billion in 2024)
Top Export Destination Countries	EU (Netherlands, Italy, UK, Germany); Saudi Arabia; Russia; Jordan; UAE; Libya; India
Top Import Source Countries	Russia (wheat), Ukraine (wheat/corn), USA (soybean, wheat), Brazil (sugar, meat, soybean), Argentina (corn, soybean), India (buffalo meat), Australia (wheat)
Membership in Agri Trade Blocs	WTO; COMESA (Common Market for Eastern and Southern Africa); GAFTA (Greater Arab Free Trade Area); EU Association Agreement; Egypt-Mercosur Agreement (2024); AfCFTA

10.2 Top Agricultural Export Commodities

Rank	Commodity	Export Volume (MT)	Key Markets	Notes
1	Citrus Fruits (Oranges)	~2.0 million MT	EU, Russia, Saudi Arabia, China, India	World’s #1 orange exporter for 6th consecutive year; ~3.8 MT production
2	Potatoes	~1.3 million MT	EU (Italy, Greece), Russia, Lebanon	3 harvest seasons; major foreign currency earner
3	Sweet Potatoes	~387,000 MT (2025)	EU, UK	Fastest growing export crop; New Lands production
4	Fresh & Dried Beans	~336,000 MT	EU, Arab markets	Includes green beans, broad beans
5	Onions (Fresh)	~288,000 MT	Arab countries, Russia, EU	Winter/summer harvest for year-round supply
6	Grapes	~191,000 MT	EU (UK, Netherlands), Russia	Thompson Seedless and Flame dominant; expanding rapidly
7	Pomegranates	~136,000 MT	EU, Russia, India	Growing premium market; Upper Egypt production
8	Mangoes	~126,000 MT	Arab countries, EU	Ismailia governorate hub; expanding export standards
9	Strawberries	~64,000 MT	EU, Gulf, Mercosur (new)	700,000 MT total production; frozen and fresh

10.3 Export Challenges & Opportunities

SPS Barriers	EU Maximum Residue Levels (MRLs) for pesticides – periodic rejections of citrus/herbs; phytosanitary certificates required for all markets; EU fish export ban (lifted Dec 2024)
Geographic Indication (GI) Products	Limited formal GI registration; potential for: Egyptian long-staple cotton (Giza 45), Siwa dates/olives, Fayoum pottery, Aswan dates

Export Promotion Agencies	Horticultural Export Improvement Association (HEIA); MALR Central Administration of Agricultural Quarantine; Egyptian Commercial Service
Agricultural Export Policy	National strategy targets USD 12 Billion in agri exports (2025 target surpassed); diversification to 160+ countries and 400+ products
Emerging Export Commodities	Sweet potatoes (387,000 MT growth), pomegranates, frozen strawberries, organic herbs, processed foods, grapes to Vietnam (new 2024 market)

SECTION 11: COMMERCIAL & EMERGING TECHNOLOGIES IN AGRICULTURE

11.1 Digital & Precision Agriculture

Satellite / Remote Sensing	MALR uses EgyptSat satellite data; partnership with ESA Copernicus; NARSS (National Authority for Remote Sensing) provides crop monitoring
GIS-based Agricultural Planning	MALR GIS Centre; SWERI digital soil maps; CAPMAS agricultural statistical database
Drone Technology	Pilot stage: pest monitoring in cotton/rice; Ministry exploring regulatory framework; not yet widespread
AI/ML-based Crop Advisory	Emerging: Microsoft FarmBeats Egypt pilot; agtech startups (Si-Ware, AgriCool) developing sensor-based advisories
IoT in Agriculture	Growing in greenhouse/export farms: soil moisture sensors, automated irrigation controllers; limited in smallholder sector

11.2 Biotechnology & Crop Improvement

GM/GMO Crop Status	Egypt approved GM maize (Bt Ajeeb YG) for commercial cultivation (first in Africa for maize, 2008); BUT cultivation was subsequently suspended. Currently no commercial GM crops. GM soybean imported for feed.
National Biotechnology Policy	National Biosafety Law (2009); National Biosafety Committee oversees GMO approvals; cautious regulatory approach
Hybrid Seed Development	Strong: ARC develops wheat (Giza, Misr, Sids, Gemmiza series), rice (Sakha, Giza series), maize hybrids (SC, TWC series); cotton varieties (Giza 45, 92, 96)
Tissue Culture Technology	Active: ARC tissue culture labs for banana, date palm, potato, strawberry; commercial micro-propagation labs operational
Gene Editing / CRISPR	Research stage at ARC and universities (Cairo, Ain Shams, Alexandria); no commercial deployment; regulatory framework under development
Biofertilizer Production	Growing: ARC produces Rhizobium, Azotobacter, mycorrhizal inoculants; government subsidizes distribution

11.3 Protected Cultivation & Controlled Environment

Greenhouse / Polyhouse Area	~100,000 Greenhouse Project expanding capacity; concentrated in New Lands and Delta fringes
Hydroponic Farming	Limited but Growing: commercial operations for lettuce, herbs, strawberries; technology transfer from Netherlands and Spain
Vertical Farming	Emerging: pilot projects in Cairo and New Administrative Capital; not yet at scale (unlike UAE)
Net House Cultivation	~10,000+ ha; shade nets used for vegetable nurseries and export-grade produce

11.4 Major Agricultural Innovations in Egypt

Innovation / Technology	Sector	Description
High-Yield Rice Varieties	Crop Science	Sakha 104/Giza 178: 9.5–10.0 t/ha yield (among world's highest); short-duration (120 days)
Nile Tilapia Genetics (Abbassa Strain)	Aquaculture	WorldFish-developed genetically improved tilapia with faster growth, disease resistance
Desert Aquaculture Model	Aquaculture	~120+ desert fish farms using groundwater + agricultural water reuse; integrated systems
Egyptian Long-Staple Cotton	Crop Science	Giza 45, 92, 96 – world's finest cotton; commands 3–5x premium price
Laser Land Levelling at Scale	Water Management	~500,000+ ha levelled; saves 20–30% irrigation water; improves uniformity
Sugarcane High-Yield Varieties	Crop Science	GT 54-9 yields 115–125 t/ha; efficient ratoon management
Bahr al-Baqar Water Treatment	Water Technology	World's largest agricultural drain water treatment (5 MCM/day); converts polluted drainage to irrigation water
Export-Grade Horticulture System	Supply Chain	Farm-to-port cold chain for citrus/potatoes achieving USD 11.5B exports

SECTION 12: AGRICULTURAL PRODUCE, FOOD SECURITY & NUTRITION

12.1 Total Agricultural Production Overview

Total Food Grain Production	~23-25 million tonnes/year (wheat 9.3, maize 7.25, rice 4.0–4.8, sorghum 0.8, barley 0.13)
Total Oilseed Production	~0.4 million tonnes (peanuts + soybean + sunflower + sesame) – heavily import-dependent for oils
Total Horticulture Production	~25–30 million tonnes/year (vegetables + fruits combined; world top-10 producer)
Total Sugar Crop Production	~29 million tonnes (sugarcane ~13 MT + sugar beet ~16 MT); sugar production ~2.5 MT; ~80% self-sufficient
Total Fibre Crop Production	~100,000 MT cotton lint + ~15,000 MT flax
Self-sufficiency Ratio (food grains)	Wheat: ~45–50% (imports ~13 MT – world’s largest importer); Rice: ~100% (surplus; exports restricted); Maize: ~50% (imports ~8 MT for feed)
Food Import Dependency	Overall: ~40–50% of calories imported; wheat imports ~13 MT/year (\$4–5B); edible oils >95% imported; meat ~40–45% imported
Strategic Food Reserves	GASC (General Authority for Supply Commodities) / Future of Egypt for Sustainable Development manages wheat procurement; strategic reserve target: 4–6 months supply; government bread subsidy serves ~70 million people
Public Distribution System	Tamween (ration card) system: subsidized bread (baladi) for ~70M beneficiaries; ration cards provide subsidized sugar, oil, rice, pasta;

12.2 Nutrition & Food Security Status

Global Food Security Index Rank	62nd globally (2022, EIU GFSI) – Score: 53.1/100
Global Hunger Index (GHI) Score	Score: 13.5 (2023) – Category: Low (improved from Moderate in 2015)
Undernourishment Prevalence	~5–7% of population (FAO 2022 est.)
Stunting Prevalence (children <5)	~13–21% (UNICEF/DHS 2014 survey; declining trend)
Wasting Prevalence (children <5)	~4–8% (moderate by global standards)
Obesity Prevalence (adults)	~32–35% (WHO 2022; double burden of malnutrition – both stunting and obesity prevalent)
Dietary Energy Supply	~3,300 kcal/person/day (FAO food balance; above recommended – reflects bread-heavy diet)
Protein Supply	~85–90 g/person/day (adequate; plant protein dominant – faba beans, bread)
Food Loss & Waste	~30–35% across value chain (est.); significant losses in vegetables/fruits due to cold chain gaps

SECTION 13: KNOWLEDGE EXCHANGE – BEST PRACTICES & LEARNING OPPORTUNITIES

This section identifies what unique agricultural strengths Egypt can offer to other BRICS nations, and what it can gain from them.

13.1 Signature Agricultural Achievements of Egypt

WHAT EGYPT CAN OFFER

#	Achievement / Innovation	Description and Proven Impact
1	World's Largest Orange Exporter	2.0–2.4 million MT citrus exports/year for 6 consecutive years; supply chain from Nile Delta to EU in <72 hours; USD 1.9B citrus export value
2	Nile Tilapia Aquaculture – Africa's Leader	1.57 million MT aquaculture (2023); 78–80% of fish from farming; Abbassa genetically improved strain; WorldFish regional hub
3	High-Yield Irrigated Agriculture	Cropping intensity 180–200%; rice yields 9.5–10 t/ha (among world's highest); wheat yields doubled to 6.7 t/ha in 30 years; 2–3 crops/year on same land
4	Egyptian Long-Staple Cotton Breeding	Giza 45, 92, 96 – world's finest cotton varieties; ARC breeding program spanning 100+ years; commands 3–5x global average price
5	Desert Land Reclamation at Scale	1.5 Million Feddan Project; Toshka; East Oweinat; added ~1 million ha since 1950s; modern irrigation on new desert lands
6	Bread Subsidy & Food Distribution System	Tamween system serves ~70 million beneficiaries with subsidized bread, cooking oil, sugar, rice; world's largest bread subsidy program
7	Agricultural Drain Water Treatment	Bahr al-Baqar plant (5 MCM/day – world's largest); converts polluted agricultural drainage into usable irrigation water
8	Medicinal & Aromatic Plant Exports	Top-5 global exporter of chamomile, peppermint, basil, marjoram; 414,000 ha organic certified area

13.2 Areas Where Egypt Can Learn from Other BRICS Nations

#	Learning Area	Country to Learn From	Gap and Opportunity
1	Digital Agriculture & E-Markets	India, China	India's e-NAM, 731 KVKs, and Kisan apps serve 100M+ farmers; Egypt lacks equivalent digital extension at scale for 5.6M smallholders
2	Drip Irrigation at Smallholder Scale	India, Israel (via China)	India has 12+ million ha under micro-irrigation; Egypt's Old Land smallholders still use 80% flood irrigation; technology transfer needed
3	Farmer Producer Organisations	India, Brazil	India's 10,000+ FPOs and Brazil's cooperatives (CONAB model) provide collective bargaining; Egypt's fragmented 0.8 ha farms need similar organisation
4	Tropical Crop Diversification	Brazil, India	Brazil's Cerrado transformation and India's diverse cropping systems offer models for Egypt's New Lands diversification beyond basic cereals
5	Large-Scale Livestock Modernisation	Brazil, India	Brazil's Embrapa cattle genetics and India's dairy cooperative (Amul) model could improve Egypt's 55% red meat self-sufficiency
6	Post-Harvest Cold Chain	China, India	China's cold chain covers 45% of output; India's is expanding; Egypt's 15–25% F&V losses need urgent cold chain investment
7	Renewable Energy for Agriculture	China, India	China's solar irrigation and India's PM-KUSUM scheme could be adapted for Egypt's diesel-dependent irrigation pumping
8	Climate-Resilient Crop Varieties	India (ICAR), China (CAAS)	ICAR's drought/heat tolerant wheat, rice, and pulse varieties directly relevant to Egypt's warming climate

13.3 Agro-Climatic Matching – Egypt-India Region Pairs

Egypt Region	India State	Climate Match	Soil Match	Key Crops	Rainfall	Priority Technology Transfer
Nile Delta	Punjab/Haryana	Irrigated alluvial plain	Heavy clay/alluvial	Wheat, rice, cotton	0–200 vs. 500–800 mm	Precision irrigation; crop residue management; straw burning alternatives
Upper Egypt (Luxor/Aswan)	Rajasthan (arid zones)	Hot arid, irrigated	Alluvial + sandy	Sugarcane, wheat, dates	0–25 vs. 100–400 mm	Solar irrigation; date palm cultivation; sugarcane varieties
New Lands (desert fringes)	Gujarat (Kutch/arid)	Arid, drip-irrigated	Sandy/calcareous	Citrus, grapes, potatoes	<25 vs. 300–600 mm	Desert farming; drip irrigation; export horticulture
Sinai Peninsula	Ladakh/Himachal (high altitude arid)	Arid mountainous	Rocky/gravelly	Temperate fruits, olives	~120 vs. 200–500 mm	Mountain agriculture; water harvesting; apple/olive cultivation
Mediterranean Coast	Tamil Nadu/AP coast	Coastal, mild winter	Sandy/calcareous	Olives, barley, figs	100–200 vs. 800–1,200 mm	Fisheries; coastal aquaculture; salinity management
Fayoum Oasis	Rajasthan oasis (Jaisalmer)	Oasis agriculture	Alluvial/sandy	Dates, vegetables	<25 vs. <200 mm	Groundwater management; oasis conservation; date processing
Nile Valley (Middle Egypt)	Uttar Pradesh (Gangetic plain)	Irrigated, fertile	Alluvial clay	Wheat, maize, sugarcane	0–25 vs. 750–1,000 mm	Crop intensification; dairy cooperatives; food processing
Delta Lakes Region	Odisha/West Bengal coast	Coastal wetland	Waterlogged/saline	Fish, rice	50–150 vs. 1,200–1,600 mm	Aquaculture-rice integration; tilapia genetics; shrimp culture

SECTION 14: REFERENCES, DATA SOURCES & ANNEXURES

14.1 Primary Data Sources

National Statistics Office	Central Agency for Public Mobilization and Statistics (CAPMAS) – Population, labour force, agricultural statistics. URL: capmas.gov.eg
Ministry of Agriculture	Ministry of Agriculture and Land Reclamation (MALR) – Crop production, livestock, agricultural policy. URL: agr-egypt.gov.eg
Ministry of External Affairs	Ministry of External Affairs (India)-MoU
Agricultural Research Centre	ARC – Crop variety development, soil research (SWERI), plant protection. URL: arc.sci.eg
FAO-STAT Database	FAOSTAT production, trade, and food balance for Egypt. URL: faostat.fao.org. Accessed 2024–2025.
FAO AQUASTAT	FAO Country Profile – Egypt – irrigation, water resources data. URL: fao.org/aquastat
World Bank WDI	GDP, population, arable land, agricultural value added indicators. URL: data.worldbank.org
USDA FAS Database	USDA-FAS Cairo office reports: Grain & Feed Annual, Livestock Annual, Aquaculture Industry 2025 Update, Poultry Annual. URL: fas.usda.gov
FAO GIEWS	Global Information and Early Warning System – Egypt country briefs. URL: fao.org/giews
IMF World Economic Outlook	GDP, GDP per capita, population estimates (2024–2025). URL: imf.org/weo
UNDP Human Development Reports	HDI ranking and score. URL: hdr.undp.org
EIU Global Food Security Index	GFSI rankings for Egypt. URL: impact.economist.com/sustainability/food-security-index
GAFRD	General Authority for Fish Resources Development – fisheries and aquaculture statistics. URL: gafrd.org
WorldFish Center	Abbassa, Sharkia – tilapia genetics, aquaculture research. URL: worldfishcenter.org
Egyptian Meteorological Authority	Temperature, rainfall, climate data. URL: ema.gov.eg
State Information Service	Official government news and statistics portal. URL: sis.gov.eg
FiBL/IFOAM	Organic agriculture statistics for Egypt. URL: statistics.fibl.org
HEIA	Horticultural Export Improvement Association – export data. URL: heia.org.eg
Peer-reviewed Journals	Remote Sensing (MDPI, 2019) – Nile Delta urban expansion; Nature (2017) – Egypt space to grow; Aquaculture International (Springer, 2024)

14.2 Glossary of Key Terms

Term	Definition
ARC	Agricultural Research Centre – Egypt’s primary agricultural research body under MALR
Baladi	Local/indigenous; used for traditional crop varieties, livestock breeds, and bread (baladi bread)

Term	Definition
Berseem	Egyptian clover (<i>Trifolium alexandrinum</i>) – primary winter fodder crop; fixes nitrogen
CAPMAS	Central Agency for Public Mobilization and Statistics – Egypt’s national statistics authority
COMESA	Common Market for Eastern and Southern Africa – regional trade bloc Egypt belongs to
Feddan	Egyptian unit of land area = 0.42 hectares = 1.038 acres
GAFRD	General Authority for Fish Resources Development – governs fisheries/aquaculture
GASC	General Authority for Supply Commodities – state wheat/commodity buyer
GERD	Grand Ethiopian Renaissance Dam – upstream Nile dam reducing water flow to Egypt
Khamsin	Hot, sandy wind blowing from the Sahara; occurs ~50 days/year (Mar–May); damages crops
MALR	Ministry of Agriculture and Land Reclamation – primary agricultural governance body
Nili Season	Third cropping season (Sep–Nov) between summer and winter – short-cycle vegetables
Tamween	Egypt’s food subsidy/ration card system providing subsidized bread and staples to ~70 million people
SWERI	Soil, Water and Environment Research Institute under ARC