

The World's Oldest Knowledge System Has No Memory

Graph Exchange: Agentic AI Memory — Fall Edition

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The Thesis

Agriculture is the world's oldest knowledge system — and one of the least digitized. Decades of field-level observations from CGIAR/CIAT, FAO, and national agricultural systems sit in disconnected databases, spreadsheets, and paper records, **invisible to modern AI**.

The Scale of the Problem

1.5 billion farm parcels. Trillions of satellite observations. 60+ years of agronomic research across 15 international centers.

Almost none of it is in a graph.

The Open-Source Plumbing

AgStack (Linux Foundation) is building **GeoID** — a deterministic, content-addressable identity layer for every field, farm, and forest on Earth.

The Knowledge Graph Layer

Palefire, recently donated to AgStack, connects those identities as nodes LLM agents can reason over — powered by Neo4j, graphiti-core, and MCP-compatible tools.

📌 **The Forcing Function:** The EU Deforestation Regulation (EUDR) now mandates geospatially verified due diligence for every agricultural commodity entering Europe — creating regulatory pressure for digitization at a scale agriculture has never seen.

The World's Oldest Knowledge System Has No Memory

1.5B

Farm Parcels

Worldwide, with no unified digital identity

60+

Years of Research

From 15 CGIAR centers and 8,000+ scientists

5 Days

Sentinel-2 Cadence

Full Earth coverage — petabytes with no field-level identity to link to

7

EUDR Commodities

Coffee, cocoa, soy, palm oil, cattle, rubber, wood — all require geospatial verification

Agricultural knowledge is trapped in CSV files on researchers' laptops, paper-based land registries across Africa and Central America, and siloed supply chain databases that never talk to each other. The EU Deforestation Regulation is the forcing function: geospatially verified proof of origin is now the law for every commodity entering Europe. Millions of smallholder farmers have **never had a digital identity for their land**. We built the plumbing to fix this. Now we need the graph.

AgStack: Open-Source Digital Infrastructure for Agriculture

LINUX FOUNDATION PROJECT

46 OPEN-SOURCE REPOS

THE ONLY LF PROJECT FOCUSED ON AGRICULTURE

Core Platform

Asset Registry / GeoID

Deterministic geospatial identity. SHA-256 of S2 compact cover.
Production: 20,800 Kenya coffee farmers · Honduras national DPI Node
(CGIAR contract).

PANCAKE

AI-native geospatial datastore. Streaming ingestion via SIPs, RAG-ready, MCP-compatible pipelines.

Palefire

Knowledge graph + LLM integration. Neo4j + graphiti-core, 18+ NER entity types, MCP server, GraphRAG via PANCAKE.

Ecosystem Tools

TraceFoodChain

Mobile-first field capture and registration.

TerraTrac

EUDR compliance mobile app for geospatial tracing.

INATrace

Blockchain traceability from farm to consumer.

OpenAgri

Agronomic microservices: crop advisory, pest/disease alerts.

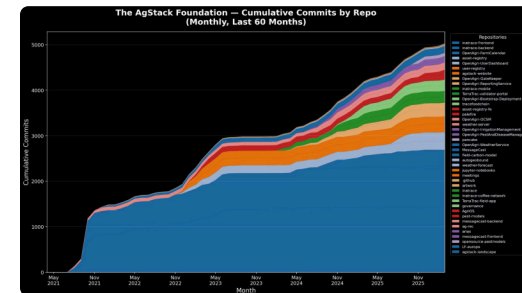
OpenAgri Farm Calendar

Digital management Web UI + REST API (EU Horizon-funded).

AgriOS

Farm ERP connecting operations, inputs, and market access.

Cumulative Commits – Last 60 Months



All tools are open-source and interoperable with GeoID, PANCAKE, and Palefire.

The Opportunity: Unlocking Agriculture's Knowledge Graph

CALL TO ACTION

What We Have • GeoID identity layer in production — 20,800+ farmers registered • Palefire: Neo4j KG + MCP server + Ghostwriter RAG • Partners: CGIAR/CIAT, FAO, EU Common Agricultural Data Space • EUR 250K CGIAR contract — Honduras national DPI Node	What We're Building (2026) • Honduras DPI Node: sovereign identity + weather + risk + credit • AR 1.5: KG entity export API + 6 MCP tools • Palefire AR adapter: GeoID as native entity type • End-to-end EUDR compliance pipeline: field → GeoID → risk → EU submission • 7 AgStack projects unified through GeoID as the spine	What We Need From You • Agentic memory architectures: persistent spatial memory at scale? • GraphRAG optimization: best patterns for spatial + temporal traversals? • Neo4j scaling: billions of S2Cell bridge nodes — what are the patterns? • MCP tool design: what makes a great spatial MCP tool interface?
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"Come build the knowledge graph for the world's food system."



Palefire
github.com/agstack/palefire



Asset Registry
github.com/agstack/asset-registry



PANCAKE
github.com/agstack/pancake