

/FactCheck (a skill I have developed) the script for legal accuracy

Executive Summary

The text is directionally right that: (1) patent rights in genes can extend to plants on a farmer's land even if the farmer owns the land and plants; (2) there is serious asymmetry between smallholders and multinationals; and (3) cocoa is biologically vulnerable to gene flow via cross-pollination and farmer-saved seed. But it overstates or misstates several key points: courts have not literally said "Mars owns seedlings on a neighboring farm via drifting pollen"; the "more than a thousand CRISPR patents" claim is unsubstantiated at that level of specificity; and the "no functioning regulator" and "zero regulatory requirements" framing for Ghana and Côte d'Ivoire is too absolute. Overall credibility: ~80/100.

Detailed Findings (per claim)

I'll go claim by claim in the order they appear.

Claim 1

"When cacao genes edited by Mars Candy Company drift in pollen onto a neighboring cocoa farm in Ghana and fertilize a farmer's trees, who owns the resulting seedlings? Well, the court says Mars does. So...he could eventually lose ownership of his entire tree inventory."

- **Verification Status:** Partially True (as analogy), Misstated as to Mars/cocoa specifically
- **Confidence:** Medium
- **Supporting Evidence:**
 - **Canada – Monsanto Canada Inc. v. Schmeiser (2004):** The Supreme Court of Canada held that a farmer whose field contains plants that originated from patented seed (even by wind or pollen) "may own the seed or plants on his land... He does not, however, own the right to the use of the patented gene, or of the seed or plant containing the patented gene or cell." https://en.wikipedia.org/wiki/Monsanto_Canada_Inc_v_Schmeiser
 - **US – Bowman v. Monsanto (2013):** The US Supreme Court held that patent exhaustion does not permit a farmer to reproduce patented seeds without permission; planting saved patented seeds is an unauthorized "making" under 35 U.S.C. §271(a). https://en.wikipedia.org/wiki/Bowman_v._Monsanto_Co.
- **Contradictory / Limiting Evidence:**
 - Neither Schmeiser nor Bowman involved **cacao** or **Mars**; they involved canola and soybeans, and different legal systems (Canada/US), not Ghanaian or Ivorian courts.

- In Schmeiser, the court did **not** say Monsanto owned the whole inventory; it said the farmer owned the plants but **not the right to use the patented gene** – a more nuanced position.
- **Assessment:**
 - It is accurate **in principle** that patent rights in a gene can override a farmer’s full use rights in plants on his own land, even if pollen or seed arrived without his intent.
 - However, saying “the court says Mars owns the resulting seedlings” is **over-specific and misleading**: the precedent is about **Monsanto**, different crops, and different jurisdictions. It’s best read as a **cautionary analogy**, not a factual description of a case Mars has already won over Ghanaian cocoa farmers.

Claim 2

“Any gene edit Mars makes to cacao using licensed CRISPR technology becomes Mars intellectual property.”

- **Verification Status:** Overgeneralization / Partially True
- **Confidence:** Medium
- **Supporting Evidence:**
 - In most jurisdictions, **novel, non-obvious breeding innovations** (including particular edited traits/alleles and their use claims) can be patented or protected as plant variety rights, subject to meeting IP criteria.
 - Mars has licensed Pairwise’s CRISPR Fulcrum platform explicitly for cacao trait development. <https://www.pairwise.com/insights/mars-and-pairwise-collaborate-to-accelerate-cacao-research-and-development>
- **Contradictory Evidence:**
 - Not every edit automatically results in a granted patent; patentability depends on novelty, inventive step, and disclosure.
 - Some edits may be too trivial, known, or fall afoul of patent-eligibility constraints, and some firms choose plant variety protection instead of or in addition to patents.
- **Assessment:** Directionally fair—Mars will **typically seek IP** over valuable edited cacao traits—but the “any edit = IP” formulation is too absolute from a legal standpoint.

Claim 3

“There are more than a thousand CRISPR patents right now at the US Patent Office that have agricultural application.”

- **Verification Status:** Plausible, but **Unverified as stated**
- **Confidence:** Medium-Low
- **Supporting Evidence:**

- Recent patent-landscape analyses (e.g., CRISPR in plants) show **thousands of CRISPR-related patent families globally**, with a substantial subset in plants/agriculture. https://www.ige.ch/fileadmin/user_upload/recht/national/e/IPI%20CRISPR%20IPLandscape%20Plants%202025.pdf
- **Contradictory Evidence:**
 - I haven't found a specific, up-to-date count from USPTO or peer-reviewed landscapes that says ">1,000 CRISPR patents at the US Patent Office with agricultural application."
 - Numbers depend on how you define "CRISPR patent" and "agricultural application" (plants only? microbes for ag? broad platform patents?).
- **Assessment:** The order of magnitude is reasonable given the global landscape, but the **exact statistic is unsubstantiated** in the sources I can see.

Claim 4

"The Supreme Courts of both Canada and the US have ruled that ownership of the physical plant is no defense against a patent claim. The patent on the gene trumps the farmer's property rights to the plant on his own land."

- **Verification Status:** Substantively True (with nuance)
- **Confidence:** High
- **Supporting Evidence:**
 - **Canada – Monsanto v. Schmeiser:** The Court explicitly held that the farmer may own plants on his land, even if they arose from blown seed or pollen, but **does not own the right to use the patented gene/cells**; his property rights don't defeat Monsanto's patent rights. https://en.wikipedia.org/wiki/Monsanto_Canada_Inc_v_Schmeiser
 - **US – Bowman v. Monsanto:** The Court held that patent exhaustion did not allow Bowman to reproduce patented seeds; his ownership of the commodity beans he bought from a grain elevator did not give him the right to make new patented plants. https://en.wikipedia.org/wiki/Bowman_v._Monsanto_Co.
- **Contradictory Evidence:**
 - Both courts leave open questions about **purely accidental, de minimis contamination** and about specific fact patterns (e.g., Organic Seed Growers v. Monsanto, where Monsanto disclaimed suing for inadvertent trace contamination).
- **Assessment:** As a **broad statement of doctrine**—that patent rights in genes can override the farmer's rights in their own plants—this is well grounded, even if worded starkly.

Claim 5

"Côte d'Ivoire and Ghana have an estimated 2 million smallholder cocoa farmers. The average farmer earns less than \$2.15 a day."

- **Verification Status:** Directionally True, but numbers vary

- **Confidence:** Medium
- **Supporting Evidence:**
 - Various NGO and sustainability reports (e.g., Fairtrade, Oxfam, and detailed modeling in *Frontiers in Sustainable Food Systems*) estimate **~1.5–2 million smallholder cocoa farmers in Côte d’Ivoire and Ghana combined** and document that a large share live **below international poverty lines (~\$1.90–\$2.15/day)**.
<https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2021.732831/full>
- **Contradictory Evidence:**
 - Exact farmer counts differ by source and year; some estimates cluster around **1.8–2.1 million** across both countries. Income figures also vary by methodology and year but consistently show most farmers below living-income benchmarks.
- **Assessment:** Fair as a **summary of scale and poverty**, though the specific “2 million” and “\$2.15” shouldn’t be treated as precise census numbers; they’re ballpark.

Claim 6

“Most cacao varieties can’t successfully fertilize themselves. Some plants can. So the pollination system that makes the chocolate industry possible is the same system that has no biological defense against engineered pollen from a neighbor’s plantation.”

- **Verification Status:** Broadly True with simplification
- **Confidence:** Medium–High
- **Supporting Evidence:**
 - Cacao is generally treated as **predominantly cross-pollinating** (allogamous) in agronomy literature, with substantial self-incompatibility in many genotypes, though some clones are self-fertile.
 - Pollination in cocoa is dominated by **insect vectors (midges)**; there is no intrinsic barrier preventing pollen (engineered or not) from moving among trees within the pollinator’s foraging range.
- **Contradictory Evidence:**
 - Some self-compatible varieties exist and are widely used; not “most can’t” in a literal biological sense everywhere, but functional out-crossing rates are high.
- **Assessment:** The **functional conclusion**—that cocoa’s reproductive biology offers no reliable, natural barrier against introgression of new alleles from neighbors—is correct.

Claim 7

“If that’s a gene-edited Mars plantation and they choose to sue for patent infringement, even if a Ghanaian farmer wins in court, the cost of fighting is more than he’ll earn in his lifetime.”

- **Verification Status:** Speculative / Unverifiable as stated

- **Confidence:** Low
- **Supporting Evidence:**
 - Patent litigation in North America and Europe typically runs into **hundreds of thousands to millions of dollars** in legal costs.
 - Many cocoa farmers in West Africa have annual **cash incomes in the low hundreds to a few thousand USD**; a lifetime total income below a single high-end Western patent case budget is plausible.
- **Contradictory Evidence:**
 - No actual cases exist yet involving **Mars CRISPR cacao vs. Ghanaian cocoa farmers**, so this is a **hypothetical scenario**, not a fact.
- **Assessment:** As a **rhetorical illustration of asymmetry**, the logic is sound; as a statement that “this will definitely exceed any individual’s lifetime earnings,” it is not empirically demonstrated.

Claim 8

“Across eight years of development, I can’t find a single published statement about how Mars plans to keep their genetic modification from spreading... The technology exists to contain it, but the Berkeley–Mars team has not used any of it.”

- **Verification Status:** Partially True (no public containment plan found); Speculative re methods not used
- **Confidence:** Medium
- **Supporting Evidence:**
 - Public communication from UC Berkeley/IGI and from Pairwise/Mars emphasizes **trait development, climate resilience, disease resistance**; I have not seen any explicit discussion in these press materials of **gene-containment strategies in cacao** (e.g., male sterility, chloroplast edits, non-flowering lines). <https://www.pairwise.com/insights/mars-and-pairwise-collaborate-to-accelerate-cacao-research-and-development>
- **Contradictory Evidence:**
 - Absence of public statements does **not prove** they are not using containment tools in breeding pipelines or trials; those details are often in internal regulatory dossiers.
- **Assessment:**
 - It is fair to say: “I can’t find public statements about their containment strategy.”
 - It is **too strong** to assert categorically that “the team has not used any containment technology” without access to confidential technical plans or field trial protocols.

Claim 9

“The Supreme Courts of both Canada and the US... [plus] ‘a multinational patents something, lets it reproduce uncontrollably, and then sues the farmer it spreads to’ – call that legalized theft.”

- **Verification Status:**

- On case law describing patent vs property: Substantively True (see Claims 1 & 4).
- On characterizing it as “legalized theft”: Opinion.
- **Confidence:** High for legal doctrine; N/A for normative label
- **Supporting Evidence:**
 - See Schmeiser and Bowman analysis above.
- **Contradictory Evidence:**
 - In **Organic Seed Growers & Trade Ass’n v. Monsanto** (Fed. Cir. 2013), Monsanto provided binding assurances not to sue growers whose crops only inadvertently contain “traces” of its biotech genes, and courts rejected anticipatory suits for lack of controversy. https://en.wikipedia.org/wiki/Bowman_v._Monsanto_Co.
- **Assessment:**
 - The underlying **risk structure**—farmers potentially liable due to presence of patented genes in their fields—is real, though companies have sometimes disclaimed suits for lower-level inadvertent contamination.
 - “Legalized theft” is a **value judgment**, not a factual claim.

Source Bibliography with Credibility Ratings

(1–5 scale for this topic.)

1. **Supreme Court of Canada – Monsanto Canada Inc. v. Schmeiser (2004)**
 - Primary law source (official judgment), summarized accurately on Wikipedia. https://en.wikipedia.org/wiki/Monsanto_Canada_Inc_v_Schmeiser <https://decisions.scc-csc.ca/scc-csc/scc-csc/en/item/2147/index.do>
 - **Rating:** 5/5
2. **US Supreme Court – Bowman v. Monsanto Co. (2013)**
 - Primary law source, summarized on Wikipedia and case reporters. https://en.wikipedia.org/wiki/Bowman_v._Monsanto_Co. <https://supreme.justia.com/cases/federal/us/569/278/>
 - **Rating:** 5/5
3. **Pairwise press release – Mars and Pairwise Collaborate to Accelerate Cacao Research and Development**
 - Company communication, authoritative about existence and scope of collaboration. <https://www.pairwise.com/insights/mars-and-pairwise-collaborate-to-accelerate-cacao-research-and-development>
 - **Rating:** 3/5 (good for “what they claim they’re doing,” not independent evaluation)
4. **Frontiers in Sustainable Food Systems – living income for cocoa producers**
 - Peer-reviewed, quantifies farmer incomes and living-income gaps in Côte d’Ivoire and Ghana. <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2021.732831/full>
 - **Rating:** 4.5/5
5. **CRISPR Patent Landscapes (e.g., IGE “CRISPR Technology 2025: Patent & License Landscape on Plants”)**

- Technical patent landscaping by an official IP office (Swiss IPI), mapping global CRISPR-in-plants IP.
https://www.ige.ch/fileadmin/user_upload/recht/national/e/IPI%20CRISPR%20IPLandscape%20Plants%202025.pdf

- **Rating:** 4/5

6. Additional commentary and academic analysis on Schmeiser/Bowman

- Harvard Law Review note, Holman, Peavey, Simmons papers on self-replicating technologies and patent exhaustion (cited in the Bowman article).
- **Rating:** 4–5/5, depending on journal.

Final Assessment and Credibility Score

Taking all claims together:

- **Solidly grounded:**
 - Patent-vs-property logic from Schmeiser and Bowman.
 - The basic biological vulnerability of cocoa to cross-pollination and gene flow via farmer-saved seeds.
 - The socio-economic asymmetry between smallholder cocoa farmers and multinationals.
- **Overstated or weakly sourced:**
 - Specific statement that courts have already said “Mars owns seedlings on neighboring cocoa farms” – that’s an extrapolation from Monsanto canola/soy cases in other jurisdictions.
 - “>1,000 CRISPR patents at USPTO for agriculture” – very plausible, but not directly substantiated at that level of granularity here.
 - Implied absence of **any** containment strategy at Mars/Berkeley, and categorical statements about Ghanaian and Ivorian regulatory vacuums from earlier reels in the series.
- **Normative framing:**
 - “Legalized theft,” “no biological defense,” “by the time we figure it out it’ll be everywhere” are **value-laden extrapolations**, not empirical facts.

On balance, the piece is a **strongly framed, advocacy-style argument** built on a mostly real skeleton of patent law and cocoa biology, but it pushes several claims beyond what the sources can strictly support.

I’d assign an **overall credibility score of 80/100:**

- + Accurate on the core legal precedents and structural risk.
- + Plausible on the socio-economic context.
- – Over-generalized and somewhat speculative in how those precedents and technologies will play out specifically in Mars–cacao–West Africa.

- – Some numerical/statistical assertions (CRISPR patent count, exact farmer numbers/incomes) not precisely sourced.

Recommendations for Further Verification

1. CRISPR Patent Count:

- Use professional patent databases (e.g., Lens.org, Derwent, PatBase) to search for **US patents with CRISPR-related claims and IPCs in plant/agriculture**; quantify how many are granted and in force.

2. Mars/CRISPR/Cacao Containment Plans:

- Look for **regulatory filings** or detailed technical presentations (e.g., at scientific conferences) describing trait deployment and gene-flow management strategies, if and when field trials move into regulated environments.

3. West African Legal Context:

- Examine Ghana and Côte d'Ivoire's **plant variety and patent laws**, plus their biosafety regulations, to see how Schmeiser/Bowman-style arguments might or might not map onto their courts, rather than assuming direct transplantation of US/Canadian doctrines.

4. Economic Harm Scenarios:

- Model the **expected costs of litigation** vs. average cocoa farmer lifetime incomes to put more precise numbers on asymmetry, rather than purely rhetorical comparisons.

US patents are enforceable in the US. Would a US-based company with a US patent be able to enforce the patent in, say Ghana?

A U.S. patent has **no legal force outside U.S. territory**, including Ghana.

Here's the clean version of how this works and where the traps are.

1. Territoriality: where a U.S. patent actually bites

A U.S. patent only lets the owner control what happens **in the United States** (plus its territories). It gives the right to stop others from making, using, selling, offering to sell, or importing the patented invention **within the U.S. market**.

What it does *not* do:

- It does **not** give any direct right to stop a Ghanaian farmer in Ghana.
- It does **not** automatically apply in Ghana, Côte d'Ivoire, or anywhere else.

If a company wants enforceable rights in Ghana, it has to obtain **Ghanaian (or regional African) IP rights** under Ghanaian law (e.g., national patents, OAPI/ARIPO where applicable, plant variety rights).

2. The ways a U.S. patent can still “reach” behavior abroad

Even though it can't control what happens strictly *inside* Ghana, a U.S. patent can still matter when there is a U.S. nexus:

- **Importing into the U.S.:**
If cocoa, nibs, liquor, butter, or finished chocolate made using a patented plant or gene is imported into the United States, a U.S. patent on that use or product can be asserted **against the importer and others in the U.S. supply chain**, regardless of where the plants were grown.
- **Acts in the U.S. that support foreign operations:**
R&D, seed production, or coordination physically happening in the U.S. can infringe, even if the resulting plants are ultimately grown offshore.

But none of this lets the company march into a Ghanaian court and say “we have a U.S. patent, therefore Ghanaian farmers must stop.”

3. If the company does have Ghanaian IP

To get traction **inside Ghana**, a company must rely on:

- A **Ghanaian patent** (if Ghana has granted one on that gene/trait), or
- A **plant breeders' right / plant variety protection** title, if Ghana recognizes and has granted it for that variety.

Then you're no longer talking about "a U.S. patent in Ghana" – you're talking about **local IP rights under Ghanaian law**, possibly based on the same invention.

In that scenario, enforcement against Ghanaian growers or traders would:

- Depend entirely on Ghanaian statutes, regulations, and courts.
- Likely involve questions of farmer's privilege (if any), seed-saving exceptions, biosafety approvals, and whatever local jurisprudence develops, not *Schmeiser/Bowman per se*.

4. Where *Schmeiser* and *Bowman* are relevant

Those cases don't extend U.S. patents to Ghana, but they do:

- Show that **Canadian and U.S. high courts** have accepted arguments that:
 - The **patent in the gene/cell can trump ownership of the physical plant/seed** on a farmer's land.
 - Saving and replanting patented seed without permission is infringement, even if the farmer "owns" the harvested grain.

So if a company obtained **parallel patents or plant-variety rights in Ghana** and Ghanaian courts chose to follow similar reasoning, you could see **functionally analogous outcomes under Ghanaian law**.

But the key point is:

- **A U.S. patent alone cannot be enforced in Ghana.**
- It can only bite when the supply chain touches U.S. jurisdiction (imports, U.S. operations), or where **corresponding local IP** exists and is enforced under local law.