RODALE INSTITUTE™

ORGANIC CONSULTING

AGRONOMIC GUIDE

REGENERATIVE ORGANIC MAÍZ PRODUCTION GUIDE PACIFIC NORTHWEST BIOREGION

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General Considerations in Transitioning to Organic- Maíz (Heritage Corn)

Heritage corn (often referred to as Indigenous Maíz) represents thousands of years of careful selection by Native communities across North America and Mesoamerica. Unlike hybrid dent corn grown for commodity markets, heritage corn varieties are open-pollinated, genetically diverse, nutrient dense, culturally significant, and often uniquely adapted to regional soils and climates. Transitioning to Regenerative Organic heritage corn production requires a systems-based approach emphasizing soil health, biodiversity, cultural respect, seed sovereignty, and ecological pest management.

The Pacific Northwest (PNW) presents unique climatic, cultural, and market conditions for heritage corn production. Unlike the Midwest Corn Belt, PNW systems are smaller-scale, diversified, and often embedded in strong local food networks, aligning well wi th regenerative and culturally rooted grain production.

Climate Considerations

Western PNW (Maritime Climate)

- Cool springs
- Mild summers
- High fall rainfall
- 150–180 frost-free days

Implications:

- Favor shorter-season varieties (85–100 days).
- Prioritize excellent drainage.
- Harvest timing is critical to avoid fall moisture damage.
- Increased disease pressure (rust, leaf blight).

Eastern PNW (Continental / Semi-Arid)

- Hot summers
- Low humidity
- Irrigation-dependent systems
- 140–170 frost-free days

Implications:

- Greater flexibility in maturity selection.
- Lower fungal disease pressure.
- Irrigation management becomes central.
- Risk of heat stress during pollination.

Site Selection and Preparation

RECOMMENDED PRACTICES

- **Full sun** (minimum 8 hours/day).
- Well-drained loam or sandy loam soils.
- Avoid heavy compaction zones.
- Select fields with low herbicide carryover history.
- Protect from strong prevailing winds if possible.

SOIL CONSIDERATIONS IN THE PNW

Western Oregon & Western Washington

- Higher soil organic matter.
- Risk of compaction in wet springs.
- Slug pressure in reduced till systems.

Recommendations:

- Avoid early planting in saturated soils.
- Consider shallow cultivation to warm soil.
- Improve surface drainage where needed.

Columbia Basin & Eastern Washington

- Lower organic matter.
- High pH soils in some irrigated districts.
- Salinity risk with improper irrigation management.

Recommendations:

- Integrate cover crops aggressively.
- Monitor electrical conductivity (EC).
- Maintain irrigation uniformity.

GENERAL SOIL CONSIDERATIONS

- Optimal pH: **5.8–7.0**
- Organic matter target: **3–6%+**
- Deep, friable soil allows strong root and brace root development.

ACTION ITEMS

- Conduct comprehensive soil test (macro/micronutrients + organic matter).
- Review 3-year field history for organic eligibility (USDA NOP compliance).
- Address compaction via cover crops like daikon radish, sorghum-sudangrass (east of Cascades, alfalfa (west of Cascades) or shallow ripping prior to transition.

Soil Management

Corn is a heavy feeder, but in organic systems fertility must be built biologically.

RECOMMENDED PRACTICES

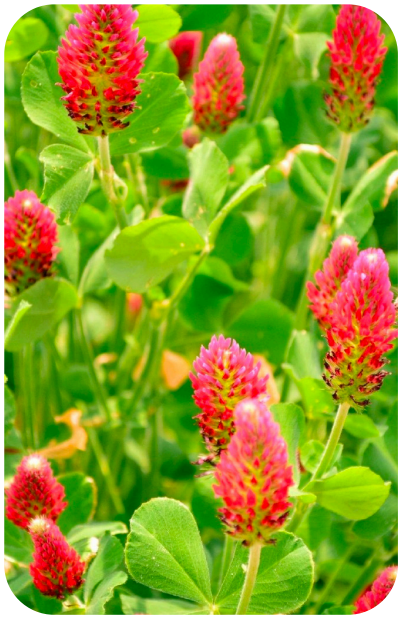
- Rotate with legumes (clover, vetch, field peas).
- Apply finished compost (2–5 tons/acre).
- Integrate cover crops to build nitrogen and carbon.
- Maintain living roots as long as possible.

ORGANIC INPUTS (OMRI-LISTED)

- Feather meal or blood meal (nitrogen)
- Fish hydrolysate
- Rock phosphate
- Kelp meal
- Gypsum (for calcium without raising pH)

REGENERATIVE CONSIDERATIONS

- Avoid over-application of nitrogen - excess leads to lodging.
- Integrate livestock grazing on cover crops if possible.
- Consider reduced tillage systems with roller-crimped cover crops like rye, oats and vetch.



Variety Selection

Select varieties adapted to your region's heat units and rainfall.

GROWING DEGREE DAYS (GDD)

Heritage corn maturity depends on heat accumulation.
(Base 50°F for corn)

- 85-day corn: ~2,000 GDD
- 100-day corn: ~2,400 GDD
- 110-day corn: ~2,700 GDD

WESTERN PNW RECOMMENDATIONS

- Flint types (shorter season)
- Flour corn selected for cool tolerance
- Trial small plots before scaling

EASTERN PNW RECOMMENDATIONS

- Flour and dent types perform well.
- Larger ear varieties possible under irrigation.
- Monitor tassel timing relative to peak summer heat.

EXTENSION SUPPORT CAN BE FOUND THROUGH:

- Oregon State University Extension Service
- Washington State University Extension
- University of Idaho Extension

REGIONAL ADAPTATION

- Coastal regions: shorter-season flint varieties.
- Inland valleys: flour or dent types.
- Arid zones: drought-adapted Southwestern varieties.

SEED SOVEREIGNTY

- Source seed from Indigenous growers when possible.
- Maintain community seed-sharing agreements.
- Avoid genetic contamination from GMO corn.

Planting

TIMING

- Soil temperature at least 50–55°F.
- Typically April–June depending on region.

SPACING

- 30–36 inch row spacing.
- 8–12 inches between plants.
- Target population: 18,000–26,000 plants/acre (lower than commodity dent corn).

PLANTING DEPTH

- 1–1.5 inches in moist soil.
- Up to 2 inches in dry, sandy soils.

CULTURAL PRACTICES

- Plant in blocks (minimum 4 rows) for proper pollination.
- Avoid early cold soil planting to prevent uneven emergence.

ISOLATION REQUIREMENTS

Heritage corn is open-pollinated and wind-pollinated.

- Maintain 1/4–1/2 mile isolation from other corn types.
- Alternatively stagger planting by 3–4 weeks to prevent cross-pollination.

Irrigation

Heritage corn often has deeper root systems than hybrids but still benefits from consistent moisture.

WATER REQUIREMENTS

- 18–24 inches total seasonal water (varies by region).

CRITICAL PERIODS:

- Tasseling
- Silking
- Kernel fill

BEST PRACTICES

- Drip irrigation for small-scale organic operations.
- Furrow irrigation in valley systems.
- Avoid water stress during pollination.

Pest Management

Organic pest management requires prevention, monitoring, and biological controls.

KEY PESTS

- Corn earworm
- Aphids
- Slugs (early season in Western PNW)
- Cutworms
- Armyworms
- Corn rootworm (regional)
- Drought stress at pollination (in Eastern PNW

MONITORING

- Weekly scouting.
- Pheromone traps.
- Threshold-based decisions.

CULTURAL PRACTICES

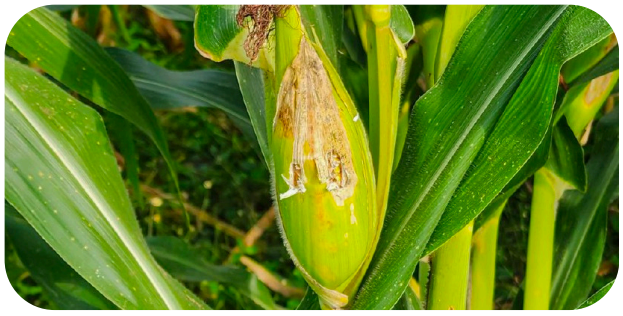
- Crop rotation (minimum 3-year rotation).
- Wider row spacing for airflow.
- Timely planting to avoid peak moth flights.
- Encourage beneficial insects via flowering borders.
- Use seedbed preparation to reduce slug habitat.

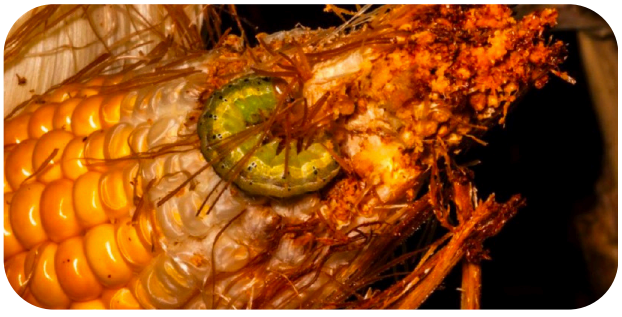
BIOLOGICAL & APPROVED INPUTS

- Bacillus thuringiensis (Bt sprays, non-GMO form)
- Spinosad (limited use)
- Release of Trichogramma wasps
- Neem oil for aphids
- Encourage ground beet
- Encourage ground beetle populations.

BIRDS & RODENTS

- Use:
- Owl boxes
- Raptor perches
- Clean field margins
- Prompt harvest of mature ears





Disease Management

KEY DISEASES

- Common rust
- Northern corn leaf blight
- Smut (Ustilago maydis)- *Also known as huitlacoche and considered a delicacy in Mexican cuisine
- Damping off (seedlings)

CULTURAL PREVENTION

- Wide row spacing for airflow.
- Avoid overhead irrigation in humid regions.
- Rotate out of corn for 2–3 years.
- Remove heavily infected residues if severe outbreak.

BIOLOGICAL CONTROLS

- Bacillus subtilis foliar sprays.
- Compost teas (if properly prepared and documented under NOP standards).

Weed Management

Corn competes moderately well once established but is vulnerable early.

MECHANICAL METHODS

- Stale seedbed technique.
- Flame weeding pre-emergence.
- Between-row cultivation at 2–4 leaf stage.
- High-residue cover crop mulch systems.

CULTURAL METHODS

- Narrower row spacing.
- Intercropping (Three Sisters: corn, beans, squash).
- Living alleyways.

ORGANIC COMPLIANCE

No synthetic herbicides. All materials must be OMRI-listed.

Irrigation

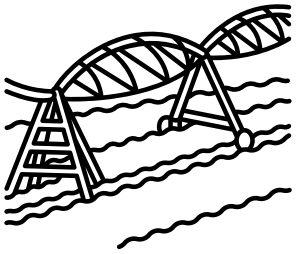
WESTERN DRYLAND SYSTEMS

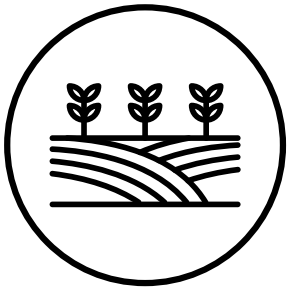
- Supplemental irrigation often beneficial.
- Overhead irrigation increases foliar disease risk.

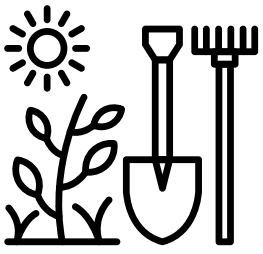
EASTERN IRRIGATED SYSTEMS

- Pivot or drip common.
- Monitor soil moisture at tasseling and silking.

Water stewardship is especially important in the Columbia Basin and Yakima regions due to regulatory and allocation pressures.







Harvesting

DRY CORN (FLOUR/DENT/FLINT)

- Harvest when husks dry and kernels hard.
- Kernel moisture ideally 20–25% at harvest.
- Dry down to 12–13% for storage.

SWEET OR FRESH CORN

- Harvest at milk stage.
- Heritage varieties will be much less sweet than modern hybrids
- Immediate cooling required.

TOOLS

- Hand harvest for small-scale.
- Corn picker attachment for larger acreage.
- Shellers (manual or mechanical).

POST-HARVEST

- Clean to remove chaff.
- Test moisture.
- Store in aerated bins.
- Monitor for weevils.

POST-HARVEST RISKS

Western PNW:

Fall rains can delay harvest and increase:

- Ear mold
- Kernel sprouting
- Mycotoxin risk

Mitigation:

- Harvest slightly earlier.
- Use forced-air drying.
- Ensure rapid shelling and drying to 12–13% moisture.

Eastern PNW:

- Lower humidity reduces mold risk.
- Dust management during harvest important.

Harvest Calendar

PREPARATION & PLANTING (APRIL/MAY):

Seeds were soaked for days before planting, often coinciding with the festival of chicomecoatl. Fields were prepared with digging sticks, arranging soil into mounds.

GROWING SEASON (MAY-JULY):

The crops were watered and tended with soil turned periodically. The Maize plants were cared for as sacred, living beings, often linked to the deity Centoetl..

MID-SUMMER HARVEST (JULY):

Young, tender corn was harvested, and the festival of Xilonen (goddess of corn) was celebrated.

FINAL HARVEST (AUTUMN):

Mature, dried ears of corn were harvested. The best cobs were kept for planting the following year, creating a continuous cycle of life and renewal.

Nahuatl - Tonalco – “heat of the sun” – dry season

-Xopan – “green period” – wet season

Regional Market Opportunities

The PNW has a strong regional grain identity.

DIRECT MARKET CHANNELS

- Regional stone mills.
- Artisan tortilla makers.
- Craft breweries.
- Farm-to-table restaurants.
- CSA grain shares.

VALUE-ADDED SYNERGIES

Heritage corn can integrate into:

- Fresh masa programs.
- Stone-milled polenta lines.
- Regenerative cornbread mixes.
- Regional grain branding tied to watershed identity (Willamette, Columbia, Skagit, etc.).

Seed Saving & Stewardship

Corn has deep cultural meaning across tribal communities in the region.

Potential engagement includes:

- Seed rematriation partnerships.
- Tribal food sovereignty initiatives.
- Educational field days.
- Land access collaboration.

Case Study: La Cocina – Port Townsend, Washington

“We opened La Cocina out of a deep desire to create something that felt both personal and meaningful—not just a restaurant, but a place that reflects who we are, where we come from, and what we value.

Food has always been at the center of our lives. It’s how we connect, how we tell stories, and how we honor our culture. We wanted to create a space where that could be shared with our community in an intentional way—through handmade tortillas, thoughtfully sourced ingredients, and dishes rooted in tradition but shaped by the Pacific Northwest.

From the beginning, our goal was to build something that goes beyond just serving meals. We wanted to create a place that supports local farmers, highlights regional grain, and brings people together around food that has a story. Every tortilla we make is a reflection of that—from field to table.

Looking ahead, our hopes for La Cocina are to continue growing in a way that stays true to those values. With our expansion into the Belmont Building, we’re excited to deepen our impact—expanding our restaurant, growing our wholesale tortilla production, and creating more opportunities to connect with the community through events, education, and collaboration.

At the heart of it all, this is about building something lasting—not just for us, but for our family and for the next generation. We want to show our daughter what’s possible through hard work, creativity, and staying connected to your roots.

La Cocina is more than a business to us—it’s our life’s work, and we’re just getting started.” - Cassandra Garay’s (co-owner of La Cocina)

Case Study: La Cocina

OVERVIEW

Located in the Olympic Peninsula, La Cocina in Port Townsend, Washington is a strong example of how heritage and regionally sourced Maiz can move from farm to table within a community-based food system. Based in temperate rainforests, alpine zones, rain shadow ecosystems and coastal ecosystems, La Cocina operates within a strong intertwined community. This community is known for its strong local food networks, its artisan grain culture, regenerative farm presence, and customers that are willing to support premium local products. This case study illustrates how locally grown Maiz, including pacific Northwest Heritage varieties, can be integrated into tortilla production in ways that strengthen regional grain economies.

THE LOCAL MAIZ SUPPLY CHAIN MODEL

The first step to tortilla production starts off with finding the right corn for the job. Sourcing pathways can include contacting Western Washington diversified farms growing short-season flint or flour corn. Short season flint corn varieties are ideal for northern climates and high altitudes due to their rapid maturity rates and cold tolerance. Flour corn is an ancient type of corn with soft, starchy, and easily ground kernels. It is primarily used for baking, tortillas, and atole. Other source pathways could be Columbia Basin irrigated heritage flour corn and cleaning hubs that serve multiple small producers. When looking for the right tortilla corn, key traits to look for include high starch, proper kernel hardness for nixtamalization, and clean, well-dried grains with 12-13% moisture.

After a successful growing season, proper cleaning and post-harvest handling is important. The corn must be cleaned mechanically. This can be achieved by using a combine to thresh the kernel from the cob out in the field or removing the kernels by hand. After removal from the cob, making sure to sort out the moldy or damaged kernels is essential. Before storage make sure to measure the moisture with a digital, handheld grain moisture meter. Digital moisture meters are the most accurate and common to come across. Make sure it is stored properly at the 12-13% moisture level. Proper storage is necessary before nixtamalization. It would be beneficial to locate regional cleaning infrastructure to maintain “local” value, without it, Maiz travels long distances defeating the purpose of “local.”

When the time comes to make masa (dough), the kernels must go through a process called “nixtamalization.” Nixtamalization is a process of treating corn in alkaline solution. Calcium hydroxide is the typical solution that is used but other solutions that can be used include limewater or wood ash. These solutions are used to improve digestibility, increase nutritional value and remove the outer husk called the pericarp. Benefits also include increase in bioavailable calcium, improved protein quality, and enhanced flavor development. For heritage Maiz, nixtamalization also highlights terroir differences, enhances color expression in the kernels (such as blue, red, white or yellow tones), and preserves the cultural authenticity.

Case Study: La Cocina

Nixtamalization is an ancient Mesoamerican process that is essential for making masa used for tortillas and tamales. It is still commonly used in present day central and southern Mexico and Central America. Without the nixtamalization process, it would be impossible to make tortillas or any other foods made with masa. The end product without removing the pericarp would result in corn flour or cornmeal. To ensure good quality, alkalinity must be properly measured. Lime concentration must be consistent. Over-alkalization affects flavor and texture while under-alkalization affects nutritional conversion. The standard starting point is I tablespoon of cal (calcium hydroxide) per 2.2 lbs of maiz.

Once the grain has been cleaned, properly stored, and has gone through the nixtamalization process, the next stage in the local maiz supply chain it to transform the processed kernels into the final product. This step determines product quality, market value, and cultural integrity. There are two primary pathways that exist: The production of masa-harina (dried nixtamalized flour) and production of fresh, whole-kernel nixtamal. Both systems can operate within a regional grain economy.

Case Study: La Cocina

PRODUCTION PATHWAY A: MASECA (DRIED NIXTAMAL FLOUR)

Process Overview

1. Corn kernels go through the process of nixtamalization
2. The maize is washed to remove pericarp
3. The maize is dried
4. The dried product is milled into fine flour
5. Flour is packaged and later rehydrated for tortilla production

Products that are needed for this type of operation include:

- Cooking kettles
- Washing system
- Dehydration system
- Hammer mill or stone mill
- Packaging equipment

The advantage of this operation results in shelf-stable products, easy storage and easily transported. Large batches of maseca can be made which results in reduced daily labor intensity and can be scalable for wholesale distribution. This pathway allows regional producers to create locally sourced maseca as an alternative to imported commercial brands. Maseca typically requires consistent water ratios.

PRODUCTION PATHWAY B: FRESH NIXTAMAL & ON-SITE GRINDING

Process Overview

- Corn kernels go through the process of nixtamalization
- The nixtamal (cooked kernels) is washed to remove pericarp
- Fresh masa is ground using a Molino or stone mill
- Dough is immediately pressed and cooked into tortillas

Fresh nixtamal systems emphasize terroirs and heritage variety distinctions. Through this operation, you enjoy superior aroma and flavor expression, It does have a shorter shelf life compared to Maseca. Using fresh whole-kernels requires daily production cycle and greater labor skill is required. Fresh masa requires adjustments depending on the desired texture. Smaller tortillerias may begin with purchasing produced maseca then transition toward local grain sourcing.

Case Study: La Cocina

LOCAL ECONOMIC RETENTION

When maiz is grown in-region, cleaned, processed, and sold locally, then revenue circulated withing the bioregion rather than exiting to national commodity markets. For small-scale tortilla producers, sourcing 50,000 – 100,000 lbs of local maiz annually can anchor 20-80 acres of heritage production.

La Cocina is currently sourcing local grain and transporting masa in order to keep up with demands. Through sourcing local grain in the pacific northwest, they help keep revenue circulating within the local economy.

CULTURAL AND COMMUNITY IMPACTS

La Cocina demonstrates how maiz is not just a crop, but a cultural bridge. By supporting growers who produce regional grain, it helps sustain Latin American food traditions while connecting them to Pacific Northwest regenerative agriculture. In this way, migrant and indigenous knowledge intersect with local farm practices. These connections create opportunities for culinary education and the exchange of cross0cultural foodways, both for people outside of Latin American cultures and for community members reconnecting with their heritage. They also help strengthen community connections within the region and create greater appreciation for traditional maiz processing.

CLIMATE AND REGIONAL ADAPTATION

Short-season flint varieties of maiz tend to perform best in the Pacific Northwest climate. Blue corn is also well adapted to the region's cooler summers. In eastern Washington, flour corn varieties perform best under irrigated conditions. Local tortilla producers, like La Cocina, can provide direct feedback to growers regarding flavor and texture of the maiz. They can also offer feedback on grind consistency to help improve processing and end use. The intensity of color is another aspect that tortilla producers evaluate. Working closely with growers allows producers and cooks to better understand how different varieties perform.

Case Study: La Cocina

COOPERATIVE INFRASTRUCTURE SYNERGY

La Cocina's model becomes more powerful when intertwined with local cleaning hubs, storage facilities, milling facilities and local distribution networks. Regional grain cleaning hubs can provide access to equipment that small farms may not be able to afford. Storage facilities allow for cooperative storage which benefits multiple producers to split the cost of infrastructure. Small stone-milling facilities help turn locally grown grain into locally produced food and strengthen the regional agriculture. Local distribution centers offer fresher products, shorter supply chains, and helps with building the relationships within the food system. A local food system allows for direct connections between farmers, processors, chefs, and consumers to build trust, collaboration, and knowledge sharing.

Service workers, such as educators and extension agents, are also a great way of supporting the local community. Research conducted by land-grant universities helps introduce new crops and crop varieties that are suited to regional conditions. Farm support organizations help facilitate this process by connecting researchers with farmers. Through farmer-led research trials and shared learning, knowledge can be passed directly to growers, strengthening the local farming community.

Together, this intertwines system of infrastructure, knowledge sharing, and community support strengthens farmer resilience and creates space for farmers and community members to share their stories.

BRANDING & STORYTELLING OPPORTUNITIES

Tortillas made from regional heritage maiz can highlight various characteristics of the farm and can serve as a public education tool. Packaging can include farmer's name and story. Relating to consumers through cultural or local connections. It can include the variety that was used for each batch. It can also educate consumers on the regenerative practices that is used on the farm.

Case Study: La Cocina

LESSONS FOR HERITAGE MAIZ IN THE PACIFIC NORTHWEST

La Cocina brings several key principles into focus:

Demand creation drives production. If restaurants or tortilla makers start asking for local maiz from farmers, then it creates demand for local farmers to produce regional maiz and for infrastructure to be brought into the communities.

Cultural authenticity increases value. Products often gain greater value when their production reflects authentic cultural traditions. At La Cocina, tortilla making is rooted in childhood experiences of working side by side with family in the kitchen.

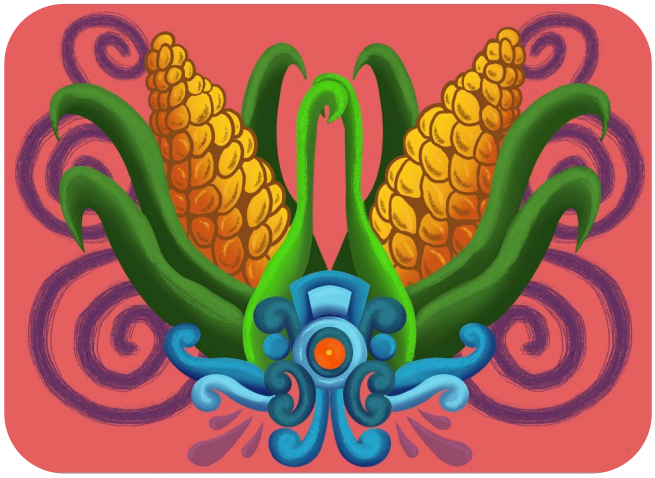
Infrastructure determines viability. For tortilla production to succeed, the necessary infrastructure must be available. Storage facilities, grain cleaning hubs and mills, are essential components that allow regional grain to be processed and transformed into tortillas. Models like La Cocina support the connection between regional farmers with culturally rooted food production.

Local grain and local cuisine create resilience. When regional crops like maiz are grown, processed and prepared withing the same region, communities rely less on distant supply chains.

By connecting farmers, processors, and cooks, regional maiz becomes a part of a cycle that strengthens cultural food systems and the long-term resilience of the local food system.

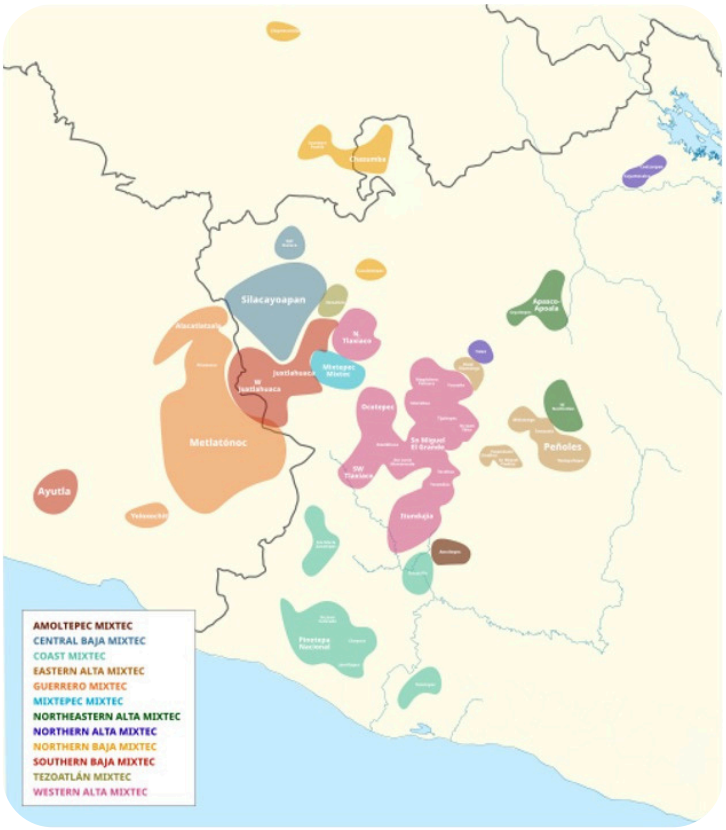
CONCLUSION

La Cocina in Port Townsend provides a powerful example of how heritage maiz can move from regenerative farm fields to culturally meaningful and economically viable tortilla production in the Pacific Northwest. This model connects regional farmers, processing infrastructure, and culinary traditions. Together, these relationships demonstrate that growing grains locally is not only agricultural, but also culinary, cultural, and cooperative.



Words in Mixteco

Nixtamal	Sá'a	Nixtamal
Mazorca	Nii	Corn
Tortilla	Xìtă	Tortilla
Molino	Molínó	Mill
Metate	Yòjó	Metate
Maíz	Nùnì	Corn kernel
Masa	Yusă	Dough
Tres Hermanas	Ùnì Kivì	Three sisters
Frijol	Ndutyì	Bean
Milpa	Itsi	Corn Field
Calabaza	Yikì	Pumpkin



Colors of Maize

- White
- Red
- Yellow
- Blue
- Maiz Pinto (white and blue mazorca)

Academic and Technical References

- USDA National Organic Program
- Organic Materials Review Institute
- Native Seeds/SEARCH
- Seed Savers Exchange
- University of California Agriculture and Natural Resources
- Oregon State University Extension Service
- Washington State University Extension

Closing Considerations

Organic heritage corn production is not merely a cropping system, it is a stewardship model. It integrates soil biology, seed sovereignty, cultural continuity, ecological pest management, and value-added market development.

For an organic operation, integrating heritage maíz into regional grain systems can:

- Diversify crop rotations.
- Strengthen cooperative seed networks.
- Support Indigenous partnerships.
- Expand value-added milling lines.
- Build cultural and ecological resilience.

STRATEGIC CONSIDERATIONS FOR SCALING IN THE PNW

If integrating heritage corn into a regenerative organic farm portfolio:

1. Start with 5–20 acre pilot blocks.
2. Test multiple varieties across microclimates.
3. Secure isolation fields early.
4. Develop forward contracts with mills.
5. Invest in small-scale grain cleaning and storage infrastructure.
6. Build storytelling into packaging and direct marketing.

The Pacific Northwest is uniquely positioned to develop a differentiated heritage corn identity rooted in ecology, seed sovereignty, and regional milling culture.

Appendix One

ENTERPRISE BUDGETS

Western Oregon (Dryland / Small-Scale Regenerative) vs Columbia Basin (Irrigated)

These budgets assume:

- Certified organic production
- 10–50 acre scale
- On-farm cleaning (no milling included)
- Heritage flour/dent types for grain market
- Moderate mechanization (not fully hand-scale, not 1,000-acre commodity)

All figures are estimates for planning purposes (2026 dollars).

A. WESTERN OREGON BUDGET

(Willamette Valley / Western WA Maritime Climate)

Assumptions

- Dryland or limited supplemental irrigation
- Yield: 70–100 bu/acre
- Average planning yield: 85 bu/acre
- Organic heritage corn price (cleaned grain): $18–$26/bu
- Planning price: $22/bu

Gross Revenue

85 bu × $22 = $**1,870/acre**

Variable Costs (Per Acre)

Category	Estimated Cost
Seed (open-pollinated)	$90
Compost (3 tons @ $55 delivered)	$165
Organic fertility supplements	$120
Cover crop seed (rotation allocation)	$45
Field prep & planting fuel	$95
Cultivation (2–3 passes)	$110
Pest & disease materials	$60
Harvest (small combine share)	$165
Drying & cleaning	$140
Labor (10–15 hrs @ $22/hr blended)	$275

Total Variable Costs: $1,265/acre

NET RETURN (BEFORE OVERHEAD & LAND)

- $1,870 – $1,265 = $605/acre

WESTERN OREGON RISK FACTORS

- Fall rain at harvest
- Slug pressure in spring
- Yield variability in cool summers
- Smaller scale limits economies of scale

TOOLS

- Hand harvest for small-scale.
- Corn picker attachment for larger acreage.
- Shellers (manual or mechanical).

OPPORTUNITY UPSIDE

If milled and sold direct at $2.00/lb flour equivalent:

- 85 bu ≈ 4,760 lbs
- 4,760 lbs × $2.00 = $9,520 gross equivalent (Processing + packaging required)

This is where vertically integrated models like Dark Sky Grain dramatically increase margins.

Appendix One

ENTERPRISE BUDGETS

B. Columbia Basin Budget (Eastern Washington Irrigated System)

Assumptions

- Full irrigation (pivot or drip)
- Yield: 110–150 bu/acre
- Planning yield: 130 bu/acre
- Organic heritage corn price: $18–$24/bu
- Planning price: $20/bu

Gross Revenue

130 bu × $20 = **$2,600/acre**

Variable Costs (Per Acre)

Category	Estimated Cost
Seed	$145
Irrigation water (energy + maintenance)	$220
Field prep & planting	$110
Cultivation	$45
Pest management	$75
Harvest (larger combine efficiency)	$140
Drying & cleaning	$125
Labor (8–12 hrs)	$220

Total Variable Costs: $1,220/acre

NET RETURN (BEFORE OVERHEAD & LAND)

- $2,600 – $1,220 = **$1,380/acre**

C. SIDE-BY-SIDE COMPARISON

Metric	Western	Columbia Basin
Yield	85 bu	130 bu
Price	$22	$20
Gross	$1,870	$2,600
Variable Costs	$1,265	$1,220
Net (pre-overhead)	$605	$1,380

After overhead + land, realistic net:
Western OR: $0–$300/acre
Columbia Basin: $600–$1,000/acre

D. OVERHEAD CONSIDERATIONS (BOTH REGIONS)

Category	Estimated Annual Allocation
Equipment depreciation	$150–$300/ac
Storage infrastructure	$80–$150/ac
Organic certification	$25–$60/ac
Insurance	$40–$80/ac
Land cost (rent)	$250–$450/ac (regional variability)

Appendix One Continued

E. STRATEGIC OBSERVATIONS FOR REGENERATIVE GRAIN SYSTEMS

Western Oregon Strengths

- Strong direct-market ecosystem
- Artisan milling networks
- High value-added potential
- Lower irrigation infrastructure risk

Best model: **Smaller acreage + direct flour sales**

Columbia Basin Strengths

- Higher yield stability
- Greater scalability
- Irrigation control
- Efficient harvest logistics

Best model: **Mid-scale production feeding regional mills or vertically integrated processing**

F. HYBRID MODEL (HIGH-PERFORMANCE REGENERATIVE SYSTEM)

If:

- Columbia Basin production
- On-farm cleaning
- Contract with regional stone mill
- Branded flour retailing

Net margins can move toward:
$1,800–$3,000/acre equivalent retail value
But this requires:

- Milling
- Packaging
- Distribution
- Marketing
- Inventory management

G. SENSITIVITY ANALYSIS

If price drops $3/bu:

Western OR becomes highly sensitive to price swings due to lower yield.

Columbia Basin is more yield-stable but more water-cost sensitive.

Appendix Two

COOPERATIVE SHARED INFRASTRUCTURE SCENARIOS

Heritage Corn (Indigenous Maíz) – Pacific Northwest Models

This section models cooperative infrastructure scenarios aligned with regenerative organic grain ecosystems as relevant to diversified PNW farms We will model three tiers:

1. **Mobile Cleaning Cooperative**
2. **Regional Hub with Cleaning + Storage**
3. **Full Vertical Integration: Cleaning + Milling + Packaging**

SCENARIO 1: MOBILE GRAIN CLEANING COOPERATIVE (LOW CAPITAL ENTRY)

Concept

A trailer-mounted grain cleaner shared among 8–15 producers across Western Oregon or Columbia Basin**.**

CAPITAL INVESTMENT

Item	Cost
Trailer-mounted air-screen cleaner	$75,000
Gravity table	$35,000
Augers + conveyors	$15,000
Moisture meter + scales	$8,000
Working capital	$17,000

Total Initial Investment: ~$150,000

ANNUAL OPERATING COSTS

Category	Annual Cost
Operator (0.5 FTE seasonal)	$32,000
Fuel + maintenance	$9,000
Insurance	$4,000
Admin	$10,000

Total Annual: ~$55,000

Throughput Assumption

- 1,200 acres equivalent serviced
- Avg 110 bu/acre
- Total volume: 132,000 bushels

Cleaning fee: $1.25/bu
132,000 × $1.25 = $165,000 revenue
Net before depreciation: ~$110,000
Break-even achieved at:
55,000 ÷ 1.25 = 44,000 bushels
This is achievable at ~400 acres production.

Impact

- Reduces on-farm cleaning cost from $2.50–$3.00/bu to $1.25/bu.
- Improves seed sovereignty.
- Builds farmer interdependence.
- Low barrier to entry.

Appendix Two Continued

SCENARIO 2: REGIONAL GRAIN HUB (CLEANING + STORAGE)

Concept
Permanent 10,000–20,000 sq ft facility serving 20–40 farms.

CAPITAL INVESTMENT

Item	Cost
Building retrofit	$600,000
Air-screen cleaner	$90,000
Gravity table	$45,000
Storage bins (100,000 bu)	$350,000
Bagging line	$150,000
Forklift + equipment	$65,000
Working capital	$200,000

Total Capital: ~$1.5 million

ANNUAL OPERATING COSTS

Category	Annual Cost
2 FTE staff	$130,000
Utilities	$40,000
Insurance	$22,000
Maintenance	$35,000
Admin + marketing	$60,000

Total Annual: ~$287,000

REVENUE STREAMS

Stream	Rate
Cleaning	$1.25/bu
Storage	$0.40/bu
Bagging	$1.00/bu
Merchandising margin	$2–$4/bu

Assume 200,000 bu throughput.
Conservative blended margin: $3.50/bu
200,000 × 3.50 = **$700,000 revenue**
Net margin before debt service: ~$413,000
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Impact

- Stabilizes prices.
- Allows aggregation for institutional buyers.
- Improves organic compliance tracking.
- Enables forward contracts.

Best suited for Columbia Basin + Western OR hybrid cooperative.

Appendix Two Continued

SCENARIO 3: FULL VERTICAL INTEGRATION COOPERATIVE (CLEANING + MILLING + RETAIL PACKAGING)

CAPITAL INVESTMENT

Item	Cost
Facility	$1,000,000
Cleaning line	$150,000
Stone mill (commercial scale)	$250,000
Packaging line	$300,000
Warehouse racking	$150,000
Working capital	$400,000

Total: ~$2.25 million

Revenue Model

Example: 150,000 bushels heritage corn.

150,000 bu ≈ 8.4 million lbs grain

Retail flour equivalent at $2.50/lb wholesale.

8,400,000 × 2.50 = **$21,000,000 gross potential**

Realistic blended (wholesale + direct mix): $12–15M gross.

Operating costs (labor heavy): $8–10M.

Net operating margin potential: $3–5M.

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COMPARATIVE ANALYSIS

Scenario	Capital	Risk	Net Potential	Best Region
Mobile	$150k	Low	Moderate	Western OR
Hub	$1.5M	Medium	High	Hybrid PNW
Full Vertical	$2.25M+	High	Very High	Columbia Basin anchor

Cooperative Governance Models

Options:

- Member-owned LLC
- Producer cooperative (patronage dividends)
- Hybrid nonprofit + operating LLC
- Tribal partnership model

Regional support:

- Oregon State University Extension Service
- Washington State University Extension
- Rural Development

Funding sources:

- USDA Value-Added Producer Grants
- USDA Rural Cooperative Development Grants
- State infrastructure grants
- Community investment notes

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