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Vegetable seed development in Mali: Assessing opportunities for irrigated seed production to improve nutrition amid climate risks and water insecurity

Photo: IFPRII-Flickr, Tingju Zhu

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CONTEXT: VEGETABLE PRODUCTION IN MALI

Challenges in producing sufficient nutrient-dense foods

Imports of fruits and vegetables increased more than ten-fold since the 1990s

Increasing domestic demand for both seed and vegetables could be met through irrigated production

Weak market conditions:

- Low density market for irrigation equipment
- Fragmented seed market, reliance on imports
- Disruptions to markets related to insecurity
- Agronomic challenges (low soil fertility)

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PATHWAY TO SUSTAINABLE IRRIGATION SCALING IN MARKET ECOSYSTEM

Evidence-based analysis and planning
(Suitability: water availability, land/ water productivity, markets, infrastructure)

Monitoring, mitigation measures

Institutional, policy, regulatory context
Tariffs/taxes, water fees, environmental regulation, finance opportunities, investment incentives, targeting;
Improved information sharing between sectors and actors;
Inclusivity and equality

Resilience and environmental sustainability
(water quality, quantity and natural resources)

Economic sustainability
(socio-economic benefits, profitability, value chains)

Sustainable smallscale irrigation

Market system

Finance system
(products, terms & rates,services)

Equipment supply chain
(import, manufacture, distribute, parts, services)

Profitable value chains
(irrigable value chain: Seed, inputs, information, produce market integration)

Private and public investment models and approaches

Supportive initiatives

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INITIAL FINDINGS ON ROLE OF IRRIGATION

Households with access to small-scale irrigation in Mali

- consume more nutrient-rich food groups when irrigating with a motor pump (consumption pathway); while Office du Niger gravity irrigation farmers increase consumption of cereals
- benefit from higher agricultural incomes (income pathway)
- usually irrigate rice, not vegetables
- low access to seeds and affordable irrigation
- education, non-farm income, participation in farmers' groups and market access increase adoption of motor pump

Only 4% of plots are currently irrigated (3% of women's plots)

CONSTRAINTS TO SCALING

Challenges for resilient seed markets and vegetable production

- Localized and national crises reinforce systemic constraints of securing access to and producing vegetables and vegetable seeds
- Crises – often concurrent extreme weather events and conflicts – worsen household water insecurity and food/nutritional insecurity
- Formal seed companies focus on high-value exotic vegetables; informal seed sector provides seed for traditional vegetables
- Reliance on imported vegetable seeds reduces resilience, increases vulnerability to conflict and market disruptions
- Seed-producing cooperatives face difficulties producing and supplying seed year-round – most seed produced only in the (unreliable) rainy season

RESEARCH OBJECTIVES

Support seed producer access to inputs – including irrigation - to create a consistent seed supply across seasons

Research seeks to better understand seed and small-scale irrigation challenges:

1. Assess the potential for developing a strong vegetable seed sector for Mali
2. Identify and prioritize entry points for supportive interventions in both the formal and informal seed sectors, notably the potential of irrigated seed production
3. Assess water (in)security and water availability at household to sub-basin scales to identify where seed and vegetables can be irrigated without growing water scarcity

FOCUS

- Review of constraints to uptake of small-scale irrigation and role of irrigation for food security and nutrition, and role of gender
- Assessment of irrigation constraints and opportunities for seed sector and contribution of irrigation to WASH
- Assessment of formal seed sector, while accounting for role of informal sector; focus on 5 priority vegetables: African eggplant, onion, shallot, tomato and pepper
- Three main contributions to seed sector analysis:
  - ✓ Situational analysis of the vegetable seed sector in Mali
  - ✓ Identify potential for irrigation to strengthen vegetable seed supply
  - ✓ Identify interventions to strengthen the vegetable seed sector

METHODS

- Qualitative and quantitative assessment of socioeconomic potential and constraints around small-scale irrigation and linkage to household water security
- Qualitative data collection for seed sector analysis, drawing on existing secondary data
- Desk-based literature review and background documentation
- Key informant interview and focus group discussions with vegetable value chain actors:
  - ✓ Governmental organizations (national research institute, certification body, seed association, ministry of agriculture)
  - ✓ Seed producers (seed companies, seed cooperatives)
  - ✓ Vegetable farmers and agro-dealers
- All fieldwork to follow social distancing measures and local COVID-19 guidelines

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VEGETABLE PRODUCTION IN MALI

- High performing across seasons
- Major vegetables: tomato, African eggplant, hot pepper, shallots and onion, potato and leafy vegetables
- Production largely restricted to rainy season
- Income for resource-poor farmers, women
- Low access to: seeds, water, markets, storage, information

Photo: Harvesting eggplant at Technology Park, Bougouni, Mali, March 2018 (Photo credit: WorldVeg)

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POTENTIAL OF IRRIGATION FOR VEGETABLE PRODUCTION IN MALI

Photo: Harvesting tomato at Technology Park, Bougouni, Mali, March 2018 (Photo credit: WorldVeg)

- Year-round production of vegetable, seed
- Avoids water shortages at critical phases
- Reduced labor, time, costs, and weeding
- Supports water security: WASH and other uses

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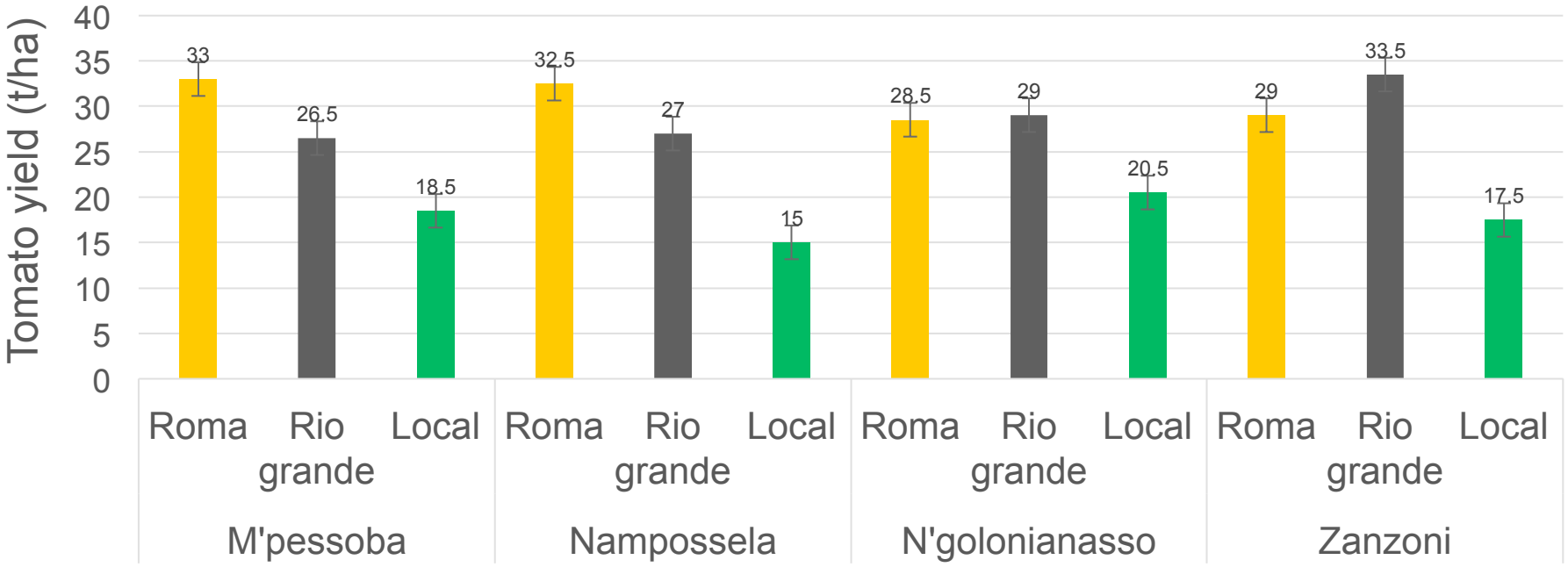
VEGETABLE PRODUCTION IN MALI: ROLE OF IRRIGATION



Yields (t ha^{-1}) of tomato varieties in farm fields (M'pessoba, & Zanzoni) & trials (Namppssela & N'golonianasso) in 2017-2018 dry season in villages of Koutiala, Mali

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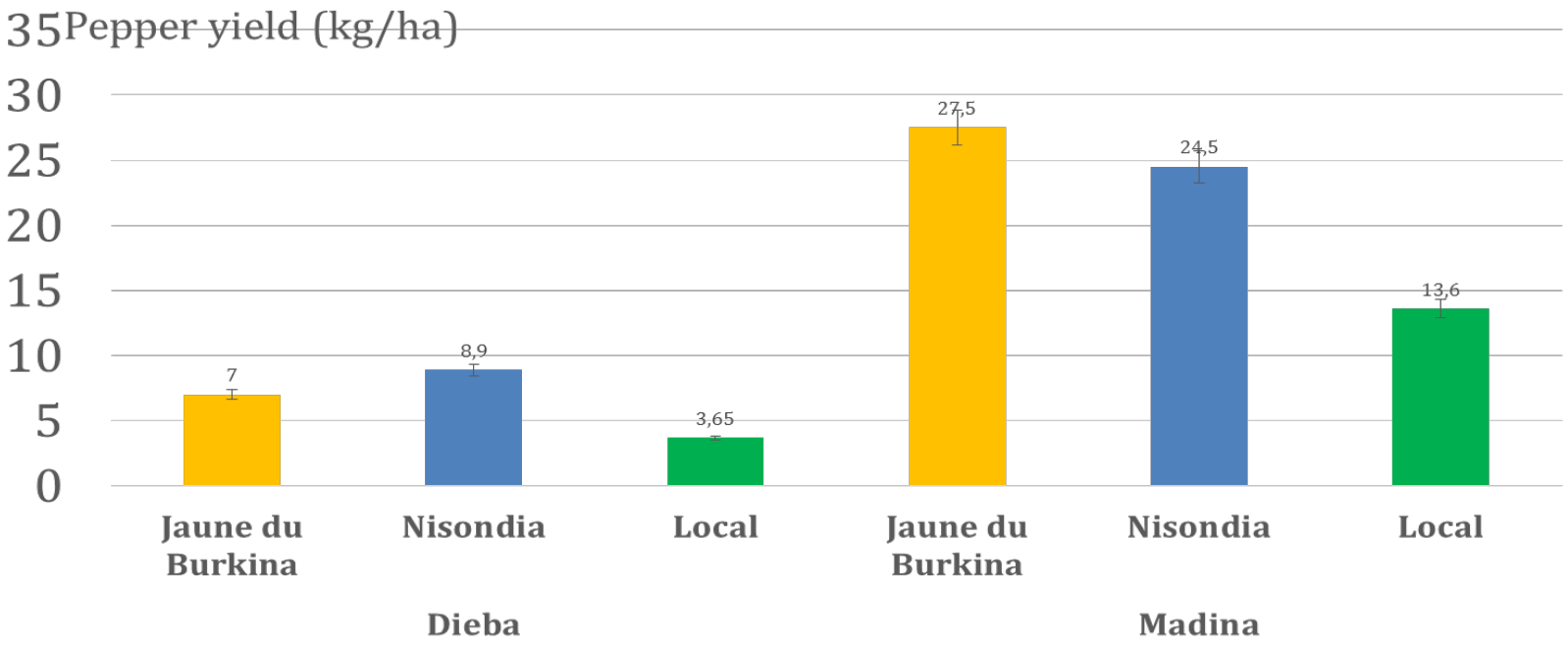
Crop performance according to irrigation systems



Yields (t/ha) of pepper varieties with shallow wells (Dieba) & drip irrigation (Madina) in demonstration trials in 2017-2018 dry season in villages of Bougouni, Mali

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'Best Practice Hubs': Facilitate learning and linkages across system

Drip irrigation

Gravity irrigation

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VEGETABLE SEED SECTOR

Two seed systems co-exist in Mali and ECOWAS region

- **Strong informal seed system**
  - Traditional seed production & supply where seeds are produced without compliance with seed regulations
  - Seeds traded directly hand-to-hand or sold in local markets
- **Weak formal seed system**
- **Existing seed regulation laws** (national & regional ECOWAS)

Formal Seed System, Mali

Seed categories	Production Responsibility	Quality analysis and control	Supervision and training
Initial seeds ↓ Breeder seeds G0 ↓ Breeder seeds G1 ↓ Breeder seeds G2 ↓ Breeder seeds G3 ↓ Foundation seeds G4	**WorldVeg, NARES (IER)**	IER, Lab. for Seed Quality tests	**WorldVeg IER** - Provides Seeds - Demo plots Training
↓ Certified seeds R1 ↓ Certified seeds R2	. Extension agents . Seed Enterprises (AGRA & non AGRA founded) . Seed farmers (Men, women's associations & organisations)	National Seed Service Laboratory for Seed Quality (LaboSem)	**National Seed Service**

ISSUES WITH SEED QUALITY

- Lack of knowledgeable vegetable seed experts (breeders, seed regulators, seed enterprises, etc.)
- Seed system of vegetables is weak compared to cereals
- No quality control for imported by vegetable seed by regulators = “fake” seed distributed by agro-dealers
- Farmers lose out! No compensation for losses from low quality seed

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COPROSEM Onion Seed Cooperative, Kayes, West Mali, 2018

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SUMMARY

- Irrigation improves household nutrition
- Current vegetable seed market & irrigation equipment supply chain: underdeveloped, largely informal, highly fragmented, lacks local-to-national integration
- **Increased access to both irrigation equipment and seeds could begin to meet demand for nutritious foods, support local market growth**
- On-going research to identify entry points to support market integration for seed, link private equipment suppliers & farmers

Expected impact: Increase seed system resilience to better withstand shocks and stresses

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