Developing Sustainable Markets for Hemp

Professor Jay S. Noller, PhD
Agricultural Hemp Research Lead and Head of the Department of Crop and Soil Science
Oregon State University
Key Points

1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production models
4. Politics vs biology: Legalization and coexistence issues
1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production models
4. Politics vs biology: Legalization and coexistence issues
History as guide to our hemp future

Sugar Cane

Industrial Hemp

Both images: Franz Eugen Köhler, Public Domain
History as guide to our hemp future

Sugar
- Cultivation of sugarcane
- Acclimatization of cultivars
- New uses/markets developed
- Efficiencies achieved
- Substitutes enter market

Hemp
- Legalization of hemp
- Acclimatization of cultivars
- New uses/markets developed
- Efficiencies achieved
- Substitutes enter market

TAKES 2000+ YEARS

TAKES 20+ YEARS
Diversity in market classes and entries

Goal in future, for producers, 3+ contracts
Market classes for hemp production

- Fiber
- Grain and seed
- Oils and extracts (cannabinoids, cannaturpenes)
- Useable and medicinal hemp
- Forage

*In future, 3 or more contracts is goal*
Can be produced over large extents
Genetic and environmental variability

• “Wild west” Closet breeding → Lab breeding
• Criminalization drove breeders to basements and closets
  • ! Light deprivation is an important tool for hemp breeding
• Transition from seed saving to plant variety protection
• Need open, scientific breeding
• Off-types are innumerable in US germplasm
• Open-field production is a frontier
Key Points

1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production models
4. Politics vs biology: Legalization and coexistence issues
Evolution in Hemp Production (2014-18)

- Hemp industry is rapidly evolving
  - Exponential growth in production (mass and area)
  - Three years, three different extraction practices
- Hemp has broad support now among small land holders
  - Initially requires hand labor, yet still profitable
  - Dropping price and processing capacity limit supply growth
- Mainstreaming of production onto large farms
  - Efficient growers grow more efficiently
Commodification effect on land holdings

% Small Land Holder

Time →
Macroeconomics of hemp markets
Introduction of hemp in crop rotation

![Graph showing the relationship between time, old crop acreage, and farm gross income.](image)
Value chains for hemp

- Highly organized value chains
  - Strong buyers - processors, distributors, commodity traders
  - Secure lending to those farmers supplying to these buyers
- Initial beneficiaries = early to market; vertically integrated
- Long-term beneficiaries = larger producers or co-ops
  - Capable of delivering high volumes at precise intervals
  - While meeting stringent quality standards
  - Reduces transaction costs for high-volume buyer
Key Points

1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production
4. Politics vs biology: Legalization and coexistence issues
Engage the research enterprise model

- Expansion and coordination of research
  - (g x e) - Multiple locations and multiple disciplines
- Public and industry support funds
  - No better time to gift funds to university than today
- Land grant universities (LGUs)
  - Ag experiment stations
  - Extension services
  - Teaching and research
- Private industry research and development
LGU research enterprise model

- Breeding and genetics
- Agronomy, horticulture, integrated pest management
- Precision ag and technologies
- Post-harvest processing
- Food science and technology
- Public and animal health
- Social and environmental sciences
Research Plots
Harvesting
Processing
No registered chemicals in US (today)

- Commercial production today is organic in practice
- But not for long
  - IR-4 chemical registration is underway
- Hemp-on-hemp monoculture will foster pest issues
- This is a large-area experiment with few parallels
Key Points

1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production models
4. Politics vs biology:
   Legalization and coexistence issues
2018 Farm Bill with American Hemp Act

- Decriminalizes hemp
- Adds prospect of national and international trade
- Sets Federal uncertainty through 2021
- Need for additional clarity
  - Funds
  - CBD and other compounds
  - Other expected federal and state interactions with commodity
Washington, D.C. - FRIDAY FEBRUARY 8, 2019

WYDEN INTRODUCES S. 420 TO LEGALIZE CANNABIS


Legislative package also empowers states to implement own marijuana laws

Senate Finance Committee Ranking Member Ron Wyden, D-Ore., today (2/8/19) announced introduction of S. 420, the Marijuana Revenue and Regulation Act, legislation that would responsibly legalize, tax and regulate marijuana at the federal level.
Cannabis, Marihuana, Hemp

- Problems with a politically divided biology
- Four tiers of the US
  - 1 - Full Cannabis legal
  - 2 - Hemp + Medicinal marihuana legal
  - 3 - Hemp legal
  - 4 - No Cannabis legal
- Delta-9 THC, Total THC
- Timing and mode of sampling to meet law
Gene flow - Corruption of harvests

• Cannabinoid output by type
  • Male = 1X
  • Pollinated female = 3-5X
  • Virgin female = 17-20X

• “Hot” hemp and crop-destroy mandate
• Feminization - all or most
• Need coordination in space and or time
  • grower communication >> regulations
Key Points

1. Hemp is a diverse agricultural commodity
2. Macroeconomic “Big Bang” of US hemp markets
3. Research → Sustainability of production models
4. Politics vs biology: Legalization and coexistence issues