

# Hemp Production in New Mexico – Ongoing Trials and Future Outlooks

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**New Mexico State University**

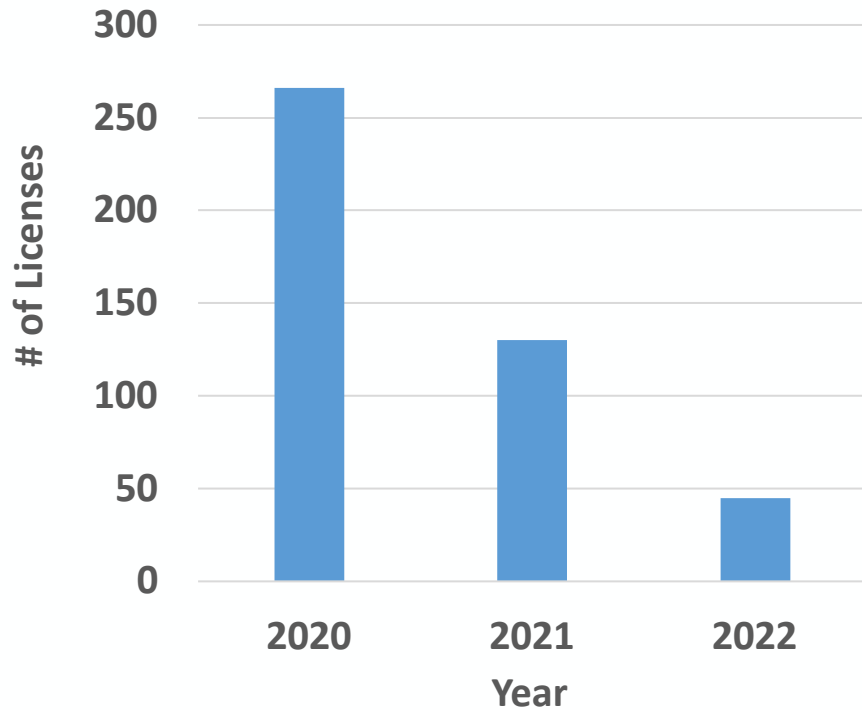
# Outline

- Hemp in New Mexico: Trends and NMSU Research
- Phytoremediation of Radionuclides
- 2021 Variety Trials (Year 1)
- 2022 Variety Trials (Year 2)
- Performance Based Sampling
- Fiber/Grain Production at Low-Latitudes
- Future of Hemp in New Mexico and at NMSU

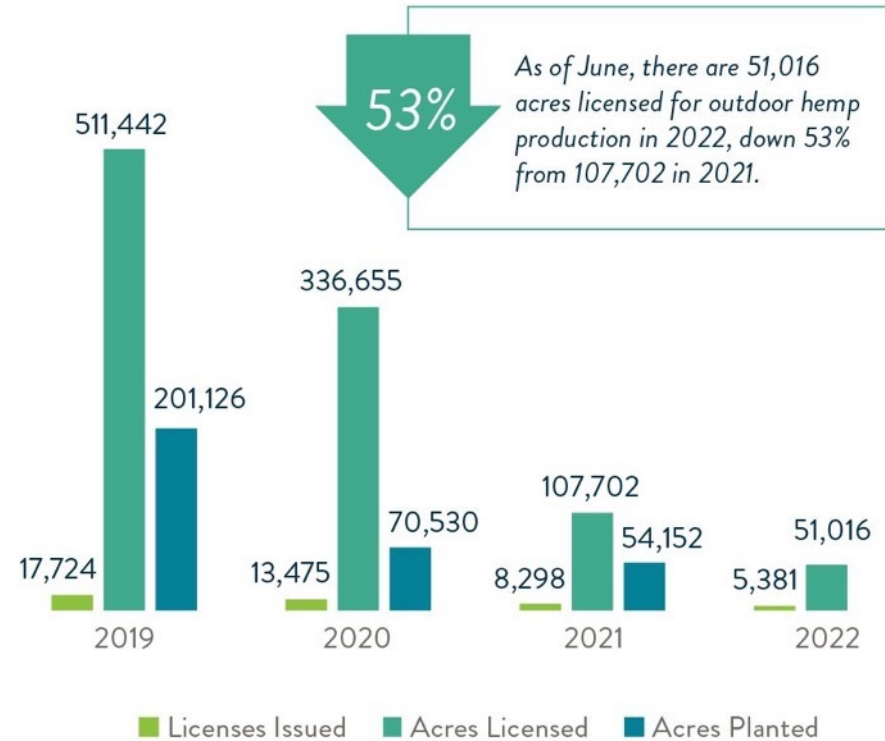


# Hemp in New Mexico: Downward Trends

New Mexico Department of Agriculture  
Hemp Licenses (Annual + Continuous)



2019-2022 U.S. Hemp Acreage



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Hemp Licenses. (2022). New Mexico Department of Agriculture, Public Records. [https://nmdapub.nmsu.edu/public\\_records](https://nmdapub.nmsu.edu/public_records)

Singular, E. (2022). Midterm Review: A 2022 U.S. Hemp Production Outlook. New Frontier Data. <https://newfrontierdata.com/cannabis-insights/midterm-review-a-2022-u-s-hemp-production-outlook/>

# Hemp in New Mexico: NMSU Research

- NMSU initial variety trial work in 2019
  - Support: Navajo Nation
  - Work was not continued
- Phytoremediation trial (2019/2020)
  - Support: BHP/Rio Algom Mining
  - Focus on legacy uranium/radium mines in northwest NM
- Expanded variety trials (2021/2022)
  - Support: COE (2021), AES (2021-22), CESFAS (2021-22), WSARE (2022)
- Characterization and pretreatment/hydrolysis of fibers from high-cannabinoid genotypes (2022/2023)
  - Support: WSARE (2022); John Kaichiro Nakayama and Tome Miyaguchi Nakayama Endowed Professorship (2022-23)



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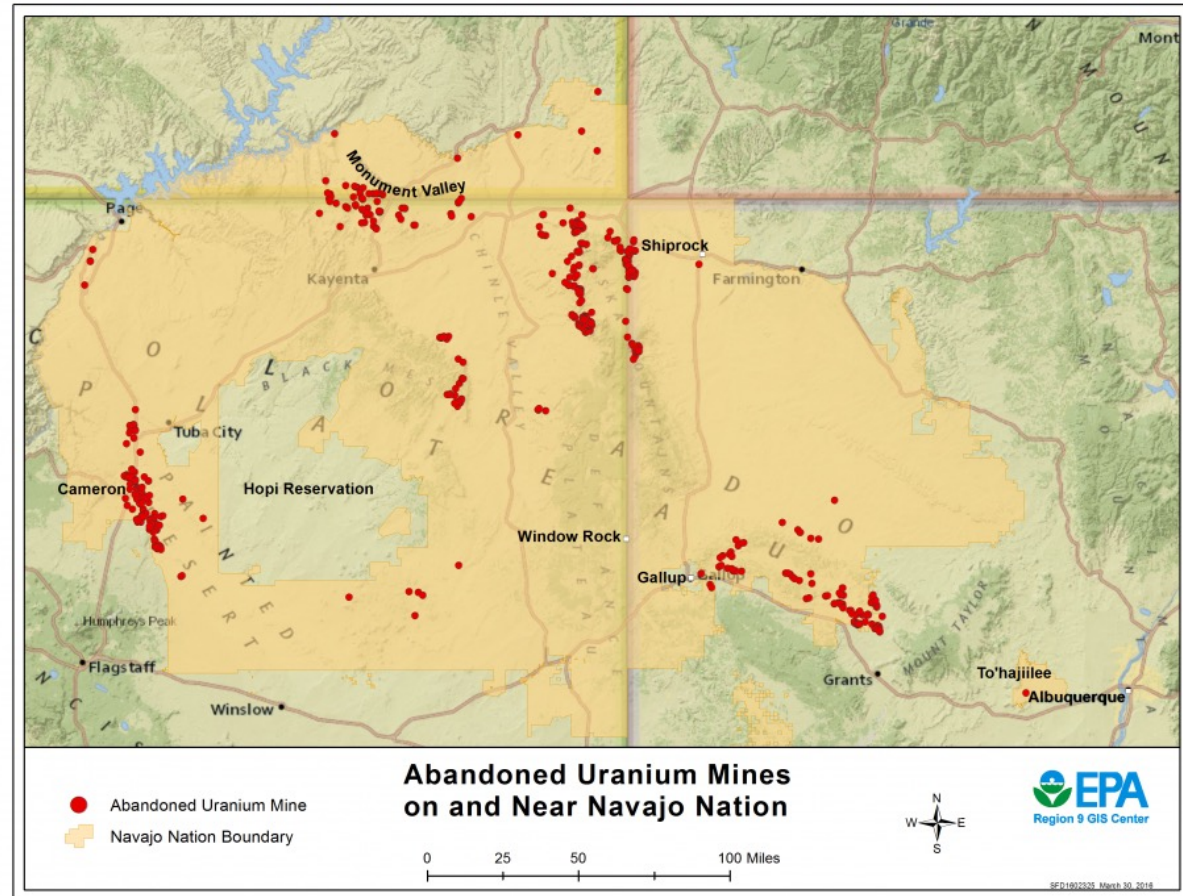


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# Phytoremediation of Radionuclides

- Over 500 abandoned uranium mines on/near Navajo Nation
- Legacy managing company interested in use of oil-seed crops for phytoremediation



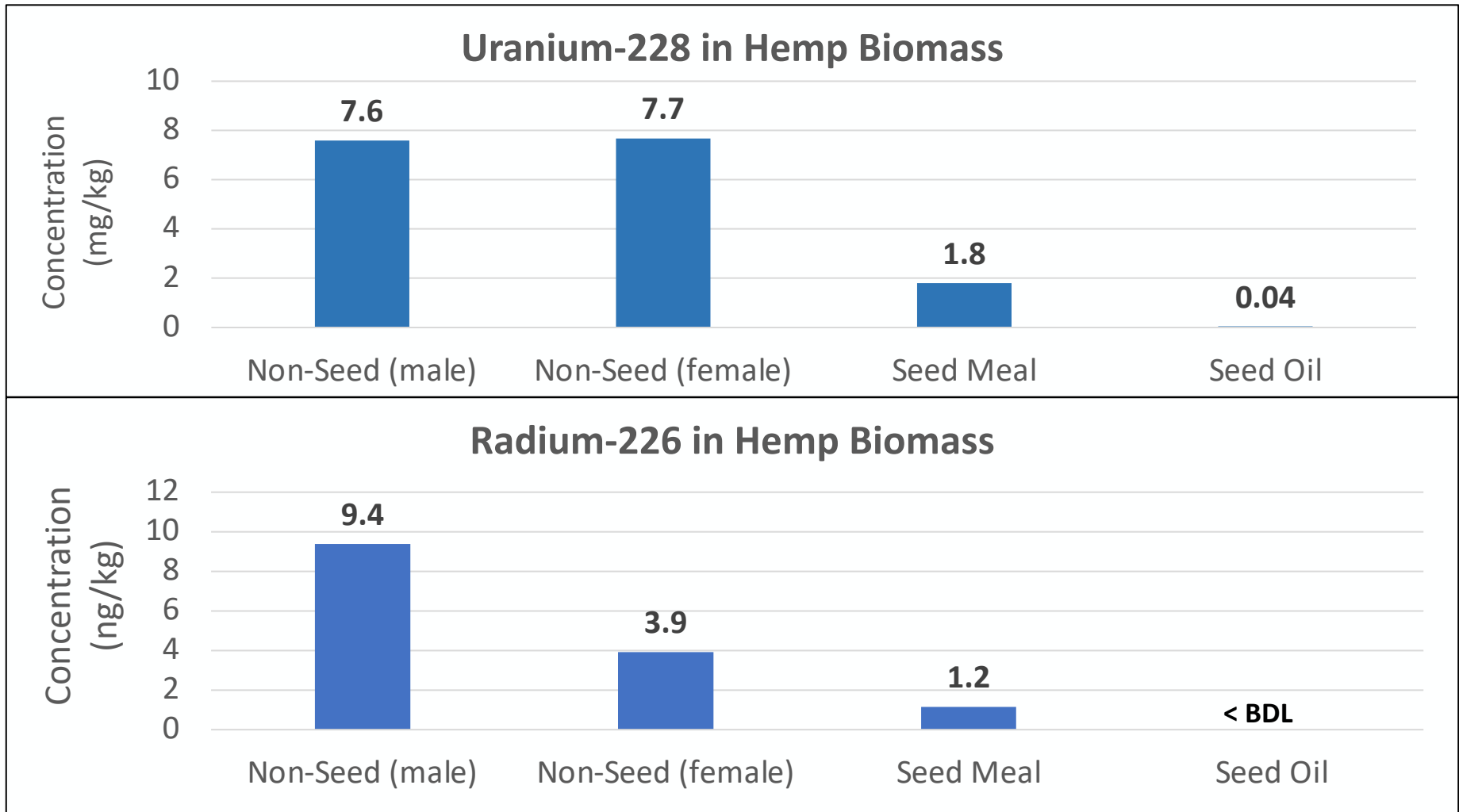


# Phytoremediation of Radionuclides

- Dioecious hemp grown in contaminated soil
- Soil contamination levels:
  - [U] = 342.6 mg/kg
  - [Ra] = 213 ng/kg
- Biomass analyzed for uranium/radium in two main fractions
  - Non-seed material (mixed stems/leaves/flowers)
  - Seed material (oil and meal after pressing)



# Phytoremediation of Radionuclides



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NOTE ABOUT UNITS

mg/kg = ppm  $\rightarrow 10^{-6}$

ug/kg = ppb  $\rightarrow 10^{-9}$

ng/kg = ppt  $\rightarrow 10^{-12}$

# 2021 Variety Trials (Year 1)



Variety Details for 2022 Hemp Trials			
<i>Variety</i>	<i>Type</i>	<i>Region of Origin</i>	<i>Planting Method</i>
Anka	Grain	Canada	Direct Seed
Altair	Grain	Canada	Direct Seed
Earlina	Grain	France	Direct Seed
MS-77	Fiber	Australia	Direct Seed
The Wife	CBD	U.S.	Transplants
Sweetened	CBD	U.S.	Transplants



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# 2021 Variety Trials (Year 1)

**Disease:** Progression of *Fusarium* sp. root rot



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# 2021 Variety Trials (Year 1)

**Pest:** Insect damage (from several species) can impact all parts of the plant

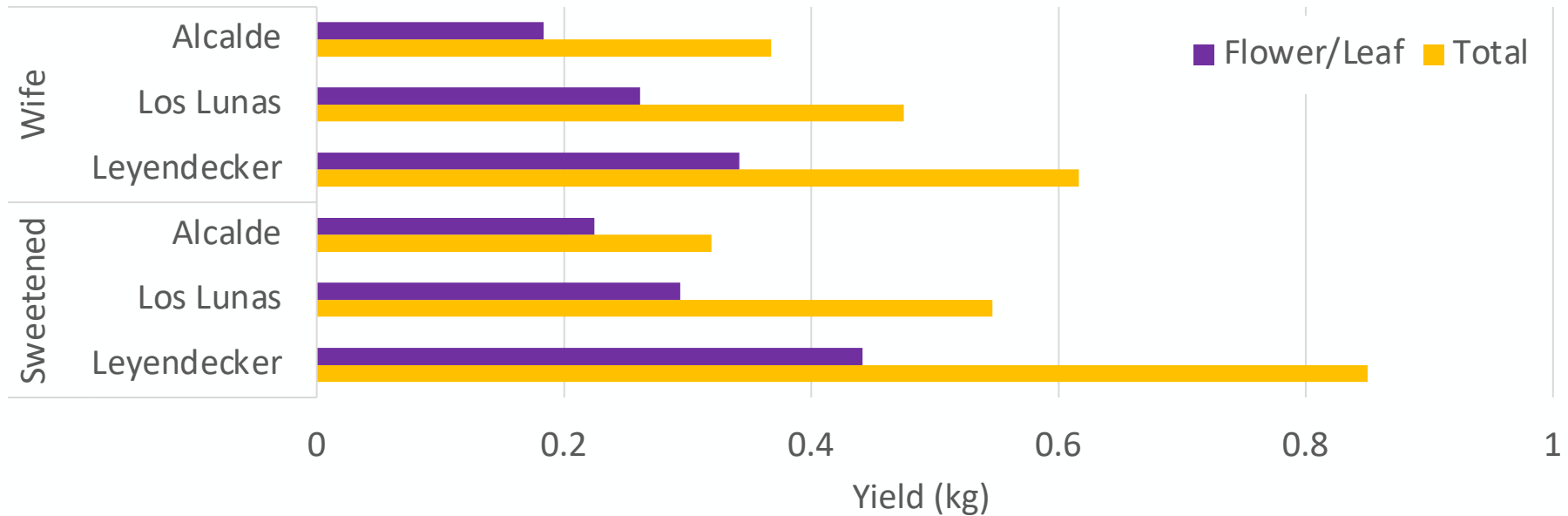
- Multiple lepidoptera species observed
- No severe infestations or damage were observed



# 2021 Variety Trials (Year 1)

- Delayed plantings at Los Lunas and Alcalde resulted in lower yields
- 30-51% of total crop weight was fiber across all sites/varieties

Average Per Plant Yields



# 2022 Variety Trials (Year 2)

- Same locations and CBD varieties
- New grain and fiber varieties
- Additional sustainability focus (WSARE)

Variety Details for 2022 Hemp Trials			
<i>Variety</i>	<i>Type</i>	<i>Origin</i>	<i>Planting Method</i>
Orion 33	Fiber/Grain	France	Direct Seed
Félinea 32	Fiber/Grain	France	Direct Seed
Futura 83	Fiber	France	Direct Seed
The Wife	CBD	U.S.	Transplants
Sweetened	CBD	U.S.	Transplants

Location Planting Details for 2022 Hemp Trials		
<i>Location</i>	<i>Planting Date</i>	<i>Sustainable Impact</i>
Leyendecker Plant Science Research Center	April 18	Water stress
Agricultural Science Center at Los Lunas	May 4	Pest management
Sustainable Agricultural Science Center at Alcalde	May 13	Organic fertilizer





# 2022 Variety Trials (Year 2)

*(Observations through July 28, 2022)*

- Stressed from initial supply issues
  - Severely stunted plants never recovered
  - More susceptible to pest/disease damage
  - Stressed/stunted plants flowered earlier than larger plants





# 2022 Variety Trials (Year 2)

*(Observations through July 28, 2022)*

- High beet leaf hopper pressure
- Beet Curly Top Virus (BCTV) detected in 'The Wife' and 'Futura 83' at Leyendecker site
- Not detected in other varieties/sites; but similar symptoms were observed





# 2022 Variety Trials (Year 2)

*(Observations through July 28, 2022)*

- Flowering response observations:  
all grain/fiber varieties flowered  
prematurely at all locations
- Sites will be evaluated for
  - Quantitative yield of  
each plot,  
per variety x location
  - Qualitative observations  
of sustainability  
treatments



# 2022 Variety Trials (Year 2)

(Observations through July 28, 2022)

Total THC and CBD Monitoring (USDA Sampling Guidelines)						
Location	Leyendecker (7/14/22)		Los Lunas (7/7/22)		Alcalde (7/7/22)	
Variety	Total THC	Total CBD	Total THC	Total CBD	Total THC	Total CBD
Sweetened	0.27	6.57	N/A *		N/A *	
The Wife	0.29	6.18	N/A *		N/A *	
Felina 32	0.2	4.92	0.04	1.19	0.04	2.26
Orion 33	0.07	2.25	< LOQ	0.98	0.03	1.68

\* Not enough floral material available for sampling

- Will submit harvest notification documents to the NMDA for Leyendecker by mid-August; continue monitoring other locations



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Total THC = THCa \* 0.877 + Δ9-THC  
 Total CBD = CBDa \* 0.877 + CBD  
 LOQ = Limit of Quantitation



# Performance-Based Sampling

- Producers operating according to USDA final rule sampling guidelines have a rigid sampling protocol regardless of crop-type
  - "All samples must be collected...by cutting the top five to eight inches...of the flowering top of the plant." (USDA)
  - Main stem, terminal bud, central cola
- Test part of the crop likely to be the highest in THC, not representative of whole plant

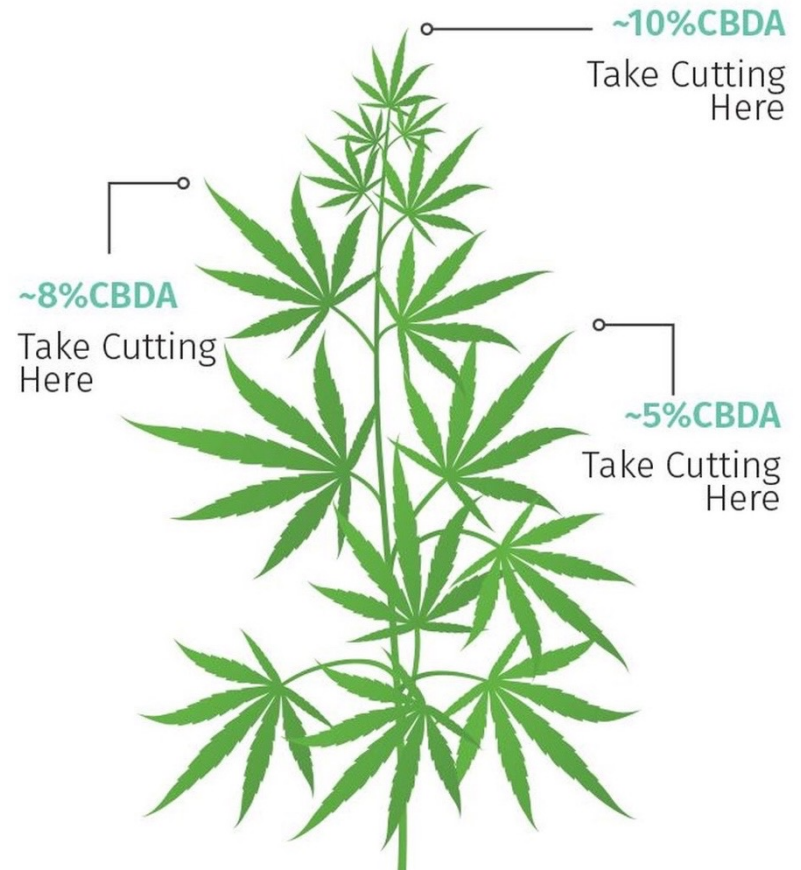


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Sampling Guidelines for Hemp. (2021). U.S. Domestic Hemp Production Program, USDA.  
<https://www.ams.usda.gov/sites/default/files/media/SamplingGuidelinesforHemp.pdf>

# Performance-Based Sampling

- NM's approved plan allows for performance-based sampling
- Accounts for variations within plants; crop types



In the event a crop will be harvested for grain or fiber and no floral material is harvested, the crop may not be subject to the sampling and testing requirements described above. NMDA will verify only grain or fiber are harvested and all other portions of the plant will be disposed of following approved destruction methods.



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New Mexico Department of Agriculture Hemp Production Regulatory Plan. (2021). <https://nmdeptag.nmsu.edu/media/pdf/hemp-production-regulatory-plan.pdf>

Smith, B. (2020). A Proposed Representative Sampling Plan for Hemp Grows. *Cannabis Science and Technology*, 3(6), 10-13. <https://www.cannabissciencetech.com/view/a-proposed-representative-sampling-plan-for-hemp-grows>

# Performance-Based Sampling

- Samples that were taken according to USDA guidelines were more likely to test “hot” than samples taken by NM performance-based guidelines

Total THC and CBD Results from Different Sampling Methods					
	Sampling Method				
	USDA Guidelines		NMDA Harvest Sample ‡		
Variety	Total THC	Total CBD	Total THC	Total CBD	Pass/Fail?
Anka	0.32 *	6.81 *	0.356	1.704	PASS
Altair	< LOQ *	1.51 *	0.224	1.561	PASS
Earlina	< LOQ *	2.77 *	< LOQ	0.719	PASS
The Wife	0.24 †	3.83 †	0.170	3.086	PASS
Sweetened	0.30 †	5.47 †	0.103	2.125	PASS

## Sampling Date

\* August 11, 2021

† August 25, 2021

‡ August 30, 2021



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Total THC = THCa \* 0.877 + Δ9-THC

Total CBD = CBDa \* 0.877 + CBD

LOQ = Limit of Quantitation



# Fiber/Grain Production at Low-Latitudes

**PREMATURE FLOWERING –  
reproductive structures appear as early as  
3 weeks after seeding for some varieties**

Possible USDA Supplemental and  
Alternative Crops grant led by Texas A&M

- Includes focus on fiber/grain varieties below 37 ° N latitude from North Carolina to Arizona

Reproductive structures appearing in  
variety 'Earlina' thirteen days after  
planting from seed @ 33.3 ° N latitude

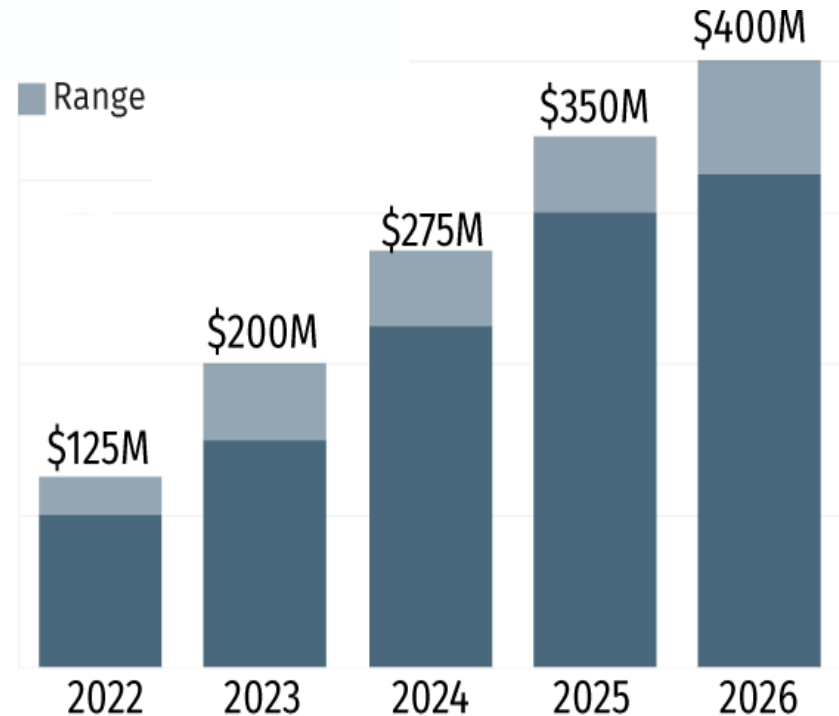




# Hemp's Future in New Mexico

- NM recreational *Cannabis* sales went live April 1, 2022
  - Adds to the existing medicinal program
  - Large market impact from Texas residents
  - 326 *active* Producer/Micro-producer licenses issued (as of 7/21/22)
- Many hemp growers switched to recreational production

Projected revenues from adult-use recreational *Cannabis* in NM (MJBiz®, 2022)



\* Projections are high end of range.



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Smith, J. (2022). New Mexico set to launch \$400 million adult-use marijuana market likely to attract Texans. *MJBiz Daily*. <https://mibizdaily.com/new-mexico-set-to-launch-400-million-adult-use-marijuana-market-likely-to-attract-texans/>

# Hemp's Future at NMSU

- Fiber characterization and processing from high-cannabinoid genotypes (ongoing)
- Phytoremediation project – Phase II (pending)
- Variety trials in 2023?
- Beyond 2023?
- Research at other NM institutions (UNM, NM Highlands)



# Additional Acknowledgements

- Collaborators Barbara Hunter, April Ulery, Frank Ramos, and Rebecca Creamer
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- Rich Global Hemp and KonopiUS for providing hemp seed material (Year 2)



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# Questions?

## Contact Information



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