

**A Joint Project to Study the Effects of Ecological Farming Practices on the Quality, Production and Ecological Health of *Cannabis sativa* Grown for Marijuana Products**



**RESEARCH TOPICS**

<b>EXPERIMENT TITLE:</b>	<b>Polycultures for Integrated Pest Management and Soil Fertility/Biology</b>
<b>PURPOSE:</b>	Study polyculture planting technique's effects on IPM, plant productivity, and soil health.
<b>ENVIRONMENT:</b>	Field
<b>DURATION:</b>	Spring 2016 through Fall 2018
<b>SEASON:</b>	Spring, Summer, Fall
<b>PLOT SIZE (ft<sup>2</sup>):</b>	TBD
<b>PLOTS:</b>	TBD
<b>AUXILLARY AREA (ft<sup>2</sup>):</b>	TBD
<b>EXPERIMENT SIZE (ft<sup>2</sup>):</b>	TBD
<b>PLANTS PER TREATMENT PLOT:</b>	TBD
<b>PREPARATIONS:</b>	<p>Preceding Fall season:</p> <ol style="list-style-type: none"> <li>1. Soil samples and soil pits for baseline data.</li> <li>2. Soil adjustment for base-saturation balance.</li> <li>3. Shallow till.</li> </ol>
<b>NOTES:</b>	

TREATMENT	CULTIVATION TECHNIQUES	STUDY TOPICS	EFFECTS
Control	<ul style="list-style-type: none"> <li>• Tilled</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aerial plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Polyculture Block	<ul style="list-style-type: none"> <li>• No till</li> <li>• No amendment</li> <li>• PC buffer block adjacent to plot, windward side</li> <li>• 10 plants</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>

Polyculture Interplanting	<ul style="list-style-type: none"> <li>• No till</li> <li>• No amendment</li> <li>• Interplant with perennial</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Annual Interplanting	<ul style="list-style-type: none"> <li>• Tilled</li> <li>• Interplant with cover crops</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Till Organic	<ul style="list-style-type: none"> <li>• Tilled</li> <li>• Organic amendments including compost,</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>

	biochar, compost teas and other	Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
Container-Mix	<ul style="list-style-type: none"> <li>• Ground Cavities</li> <li>• Compost teas.</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>

<b>EXPERIMENT TITLE:</b>	<b>Earth Structures and Soil Inoculation for Integrated Pest Management and Soil Fertility/Biology</b>
<b>PURPOSE:</b>	Study earth/biomass combinations on IPM, plant productivity, and soil health.
<b>ENVIRONMENT:</b>	Field
<b>DURATION:</b>	Spring 2016 through Fall 2018
<b>SEASON:</b>	Spring, Summer, Fall
<b>PLOT SIZE (ft<sup>2</sup>):</b>	100
<b>PLOTS:</b>	6
<b>AUXILLARY AREA (ft<sup>2</sup>):</b>	0
<b>EXPERIMENT SIZE (ft<sup>2</sup>):</b>	600
<b>PLANTS PER TREATMENT PLOT:</b>	10
<b>PREPARATIONS:</b>	<p>Preceding Fall season:</p> <ol style="list-style-type: none"> <li>1. Soil samples and soil pits for baseline data.</li> <li>2. Soil adjustment for base-saturation balance.</li> <li>3. Shallow till.</li> </ol>
<b>NOTES:</b>	

TREATMENT	CULTIVATION TECHNIQUES	STUDY TOPICS	EFFECTS
Control	<ul style="list-style-type: none"> <li>• Tilled</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• Cannabinoid profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Soil Organic Matter supplementation and inoculation	<ul style="list-style-type: none"> <li>• No till</li> <li>• No amendment</li> <li>• Interplant with perennial</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Container-Mix	<ul style="list-style-type: none"> <li>• Ground Cavities filled with high-bio container-mix.</li> <li>• Compost teas</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>

		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Compounds of Interest	<ul style="list-style-type: none"> <li>• CBD profiles</li> <li>• Terpene profiles</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Soil/Buried-wood combinations	<ul style="list-style-type: none"> <li>• Tilled</li> <li>• Interplant with cover crops</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>
Eco Intensive Beds	<ul style="list-style-type: none"> <li>• No till</li> <li>• No amendment</li> <li>• 10 plants</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil nutrient profile (chemical)</li> <li>• Soil biology – functional groups, major taxa, significant species</li> <li>• Physical characteristics (structural): bulk density, infiltration rate, water-holding capacity.</li> </ul>
		IPM	<ul style="list-style-type: none"> <li>• Pest populations</li> <li>• Production set-backs</li> <li>• Plant-damage</li> </ul>
		Plant Production	<ul style="list-style-type: none"> <li>• Root development</li> <li>• Aboveground plant: weights, heights, internode length, flower/mass ratio</li> <li>• Tissue content</li> </ul>
		Costs	<ul style="list-style-type: none"> <li>• Labor.</li> <li>• Materials</li> </ul>