ProfitProAG Farm Report January 2019

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Manure Master

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Crop Management News

by Dr. Jim Ladlie, ProfitProAG President

USTRIAL

File Aroduction

INDUSTRIAL HEMP

Regenerative Farming Systems

can be repeated indefinitely without a net cost to the environment, food chain and consumer.

It results in:

- \checkmark a net gain in soil productivity
- \checkmark carbon fixation in humus
- \checkmark nutrient density to food and fiber
- improved air and water quality
 - net improvement in consumer health
 - improvement in profitability



More from Every Acre... More From Every Animal

FREE Teleconference Calls

Agronomic/Livestock 3rd Thursday of the Month January 17, 2019

Call # 1-855-212-0212

<u>Meeting ID #</u> 769-100-082#

<u>Time</u> 8 to 9 pm Central Time

For More Information or to find a Consultant in Your Area

Call 1-888-875-2425 Ask about the ProfitMaster™ Full-Circle System and the Manure Master™ Program www.profitproag.com



Work at our Albert Lea, MN office

Manure Master Program Sales & Service

for North Iowa & Southern Minnesota

For details call John at **507-373-2550**



Innovative Manure Management manuremaster.com "The Manure Treatment Experts"

Quality Industrial Hemp Starts with Healthy Seedlings

The key to consistently **high quality, industrial hemp** starts with healthy soils and plants. To achieve this, biodiversity must be established in the soils and plant foliage with balanced soil mineral nutrition and enhanced soil organic matter levels (bioactive carbon).

Hemp stem and grain quality is only derived from increased levels of minerals and carbohydrate structures within the plants. Starting the seeds correctly right from germination and forward is crucial to achieve the end result of high quality fiber, hurd and seed production. Beneficial organisms that work with the plant throughout all the growth stages deliver the required vital and essential nutrients to produce high quality hemp. The application of all the minerals, including both major nutrients (9) as well as the trace elements (70), is also essential and cannot be overlooked. The beneficial biology not only surrounds the plants with required minerals, but also protects the plants from soil pathogens. The trace elements provide the necessary minerals for the plant to adjust its chemistry for the production of high quality plant metabolites (nutrient rich compounds) and allows the plant a defense mechanism that alters its internal chemistry for disease prevention from both the soil and air.

High yield fiber, hurd and grain are only possible with the correct aerobic biology in the root systems and the right broad spectrum (80) minerals used throughout the growing season. There are no exceptions! Plants provided with less produce lower quality and are more prone to stress and pests.

Some of the tools and techniques used to achieve high quality hemp production include crop rotation, cover crops, Eubio-NBS (natural biological stimulant), **biological seed coatings** and natural organic ores for a base nutrient program with over 75 trace elements (soft rock phosphate, potassium sulfate and elemental sulfur).

2019 Early Cash Disc	y Order Product sount Program				
All products on convention products listed below).	• All products on conventional and organic price sheets (except for products listed below).				
The Early Order Product Cash Discount Program (E.O.P.C.D.P.) is for 2019 crop year inputs.					
Deadline Discount Dates 2019 Retail Early Order Product Cash Discount ^{1,2}					
T 16 21 2010	20/				

 January 16 – 31, 2019
 3%

 February 1 – 28, 2019
 2%

¹Cash or check

²Products **NOT** included in the 2019 Early Order Product Cash Discount Program:

· Human products

Commercial fertilizers
 Manure pit treatment products
 Services

Equipment

For more information or to place an order call:

Dennis Klockenga - 320-333-1608 (cell) / dklockenga@profitproag.com Chris Chodur – 507-402-4195 (cell) / cchodur@profitproag.com or call ProfitProAG at 1-888-875-2425 (toll free)

Impact of Biological Seed Coating on Early **Industrial Hemp Seed** Development



Industrial Hemp Seeds Coated with ProfitCoat[™] PB



ProfitProAG's seed treating products are made with organic compliant materials and can be approved by organic certifying agencies for USDA-NOP programs. As with any organic crop input, growers must contact their organic certifier and get pre-approval of any seed coating additive to be used in their organic cropping system. Because of differences among the various certifying agencies and differences between NOP/EU/JAS/COR ingredient lists, we cannot guarantee that our products will be allowed by your certifier on your farm.

Industrial Hemp Seeds Uncoated



Producing Quality & Value-added Industrial Hemp Fiber, Hurd & Gra

by Dr. Jim Ladlie, ProfitProAG President

Measuring BRIX is one of the simplest ways to evaluate hemp crop health, quality and productivity.

Brix is measured with a refractometer that measures (scale 0 to 32) total dissolved solids in plant sap (Brix) and provides information about photosynthesis, proteins and sugars. Low Brix levels (<12) can indicate a lack of balanced nutrients within the plant and/or the effect of environmental stress factors due to poor growing conditions (wet soils, cloudy weather, etc.) or low fertility. Low BRIX (<12) plants are more likely to be attacked by insects and/or disease. Brix readings of >12 indicate good plant health.

Refractometer Readings

Within a given species of plant, the crop with the higher refractive index will have higher sugar, mineral and protein content, as well as a greater specific gravity or density. This adds up to a sweeter tasting, more minerally nutritious food with a lower nitrate and water content and better storage characteristics. It is more resistant to insects and diseases. Crops with high sugar content have a lower freezing point and, therefore, are less prone to frost damage. Soil fertility needs may also be ascertained from this reading.



Visual Refractometer



Plant likely to be attacked by insects and/or disease







Objective: To produce quality fiber, hurd and seed. The seed and stem should be of high nutrient density to assure quality processing and utilization. Perception of brand value is based on quality.

Name:			Date:
Business Name:			PI_ANTING:
Acres:	Owned:	Rented:	
Yield Goal/Acre:			• Row width:
Soil Sampling Required:			Seeding method:
Notes:			Likely planting date:

Production Plan: A tailored individual industrial hemp production program will be developed after consulting with a ProfitProAG Crop Consultant.

Fall-

Cover Crops

PRODUCT	Rate/Acre	Application Timing	Cost/Acre	Total/Acres
Optional				

Soil Test

- Need a Complete Soil Test with base saturation and trace elements prefer Midwest Labs
 - Pull soil samples at 6 inches deep
 - Pull samples every 20-40 acres in a zig zag pattern for each sample
 - Pull 8-10 soil cores per sample, mix in a bucket and collect enough soil to fill 1 pt
- Follow fertility recommendations based on ProfitProAG's recommendations

Fall or Early Spring Organic Plant Nutrients

Organic plant nutrient usage needs to be based on field-by-field soil test

PRODUCT	Rate/Acre	Application Timing	Cost/Acre	Total/Acres
 Soft Rock Phosphate 		Fall/Early Spring		
• Potassium Sulfate		Fall/Early Spring		
• Elemental Sulfur		Fall/Early Spring		
• Humusolver Granular		Fall/Early Spring		



Pre-plant -

Soil and Plant Health Enhancer

• Eubio-NBS (c10) stimulates soil biology to enhance root growth, nutrient availability and plant health/productivity.

PRODUCT	Rate/Acre	Application Timing	Cost/Acre	Total/Acres
• Eubio-NBS (c10)	12.8 oz/Acre	Broadcast before or after planting	\$10.00/A	

At-plant _____

Plant a heavy population to maintain canopy cover to ensure that canopy is closed quickly to out-compete weeds.

- 30 lbs/A
- Plant in narrow rows to help choke out weeds
- Balance soil fertility for less weed competition

Seed Treatment/Coating/Inoculant

PRODUCT	Rate/Acre	Application Timing	Cost/Acre	Total/Acres
• ProfitCoat PB	1.2 oz/30 lbs	At-plant	\$7.60/A	

In-season ————

Foliar Plant Nutrient (Hemp Canopy)

• Spray on tram-line in drilled planting. Multiple foliar plant nutrient applications can be made.

PRODUCT	Rate/Acre	Rate/Acre Application Timing		Total/Acres
• GroPAL provides the plant with trace elements that are vital for healthy plants	25.6 oz	Hemp Canopy	\$11.25/A	
• Molybdenum 3% needed to turn N into protein	3 oz	Hemp Canopy	\$1.10 to \$2.20/A	
• Eubio-NBS (c10) Apply to foliage to stimulate plant growth and quality	12.8 oz	Hemp Canopy	\$10.00/A	

Total Cost_____

Cost/Acre _____

Cost/bushel (Y.G.____bu)_____

Other Management Products:

Comments:

Livestock & Manure Management News

by Dr. Jim Ladlie, ProfitProAG President



Barn Environment Improvements

- Reduces odors & lethal gases (H,S, NH₃, etc.)
- Reduces flies
- Improves animal health
- Improves working environment & employee retention
- Reduces washing & cleaning time
- Regain pit/lagoon capacity

Manure Enhancements

- Reduces manure putrefaction
- Liquefies manure
- Less agitation required (50% or more)
- Improves consistency of manure (Top to bottom)
- Reduces pathogen load in manure
- Reduces manure toxins (salts)

Soil Health & Crop Enhancements

- Improves root zone health & crop yields/quality
- Predigested manure "no lag phase in-field"
- Improves nutrient value & retention
- Improves soil biology & health
- Improves uniformity of in-field applications
- Improves N soil fixation
- Reduces weed & pest pressure over time
- Better in-field crop residue decomposition



Growers who understand the value of bioaugmented manure can reduce plant nutrient cost, improve soil and plant health, improve crop residue decomposition, detoxify the soil (reduce salts) and improve nitrogen and other plant nutrient efficiencies.

Business Enhancements -

- Improves overall business performance
- Reduces potential risk
- Improves livestock health and performance
- Improves employee working conditions & retention
- Normally after 2 to 3 years of applying biologically treated manure, a 5 to 15% yield response is achieved
- Reduces agronomic input cost
- Improves manure utilization cover more acreage with same volume of manure

Improved Feed Value & Quality

- Improves nutrient content (trace elements) and energy
- Higher crop/feed brix values
- Reduces aflatoxins & mycotoxins in feed



- Improves neighbor & community relations (Reduces odor during transportation & application)
- Reduces environmental impact after field application
- Improves longevity of equipment & facilities (Less corrosion & maintenance cost)
- ✤ Increases the amount of manure that can be irrigated
- Reduces the time required to complete a pump-out



"The Manure Treatment Experts"

Providing:

- KNOWLEDGE - EXPERIENCE - EFFECTIVE TECHNOLOGY - ON-GOING SUPPORT & SERVICES - PERFORMANCE ASSURANCE



Innovative Manure Management manuremaster.com "The Manure Treatment Experts"



More from Every Acre, Every Animal & Every Gallon of Manure

Featured Product of the Month

Eubio-NBS (c10) Soil & Plant Natural Biological Stimulant

PRODUCT DESCRIPTION:

Eubio-NBS (c10) is a "Next Generation" Natural Biological Stimulant. It optimizes and stimulates the biological medium to help increase already existing natural processes that are essential for healthy soil and plants.

Eubio-NBS (c10) is biodegradable, non-toxic, nonhazardous, non-corrosive, non-irritating and does not require PPE.

GUARANTEED ANALYSIS:

Clear aqueous liquid 100%

INGREDIENTS:

A clear aqueous liquid, safe and non-toxic.

USAGE AND APPLICATION RATE:

The application rate is 12.8 oz per acre (10 acres per gallon of c10) for both soil and foliar applications. It is recommended to apply a soil application and one to two foliar applications during the season depending on crop value.

<u>Soil Application</u>, Eubio-NBS (c10) can be applied as follows: broadcast or strip-tilled Fall or Spring, in furrow and through surface or subsurface irrigation.

<u>Foliar Application</u>: Eubio-NBS (c10) can be applied once or multiple times during the season at optimum vegetative and reproductive status of a crop.

<u>Manure Application</u>: Eubio-NBS (c10) can be mixed into liquid manure at the rate of 12.8 oz per acre (10 acres per gallon of c10).

STORAGE:

Normal Warehousing. Product is freeze/thaw stable. Shelf life three years.

LIMITATION OF LIABILITY:

Due to system variations and other additives that may be present, please discuss usage of Eubio-NBS (c10) with our technical representative.

Eubio-NBS (c10) has no known negative impact on natural biological processes.

"Green Organic Regenerative Technology"

Eubio-NBS

Eubio = Healthy Ecosystem/Life NBS = Natural Biological Stimulant



ProfitPro[®]AG invites YOU to call in on the third THURSDAY of the month for the **FREE TELECONFERENCE**

A cost-effective and convenient way to gain knowledge on new crop production technologies

It's Easy . . . It's FREE Thursday, January 17, 2019 8:00 p.m. Central Time

UPCOMING SUBJECTS

Industrial Hemp

How is high quality industrial hemp grown and evaluated? What results can be expected using Regenerative Farming Systems? **Bryan Parr, Legacy Hemp and Dr. Jim Ladlie, ProfitProAG President,** will help answer these questions and more.

ProfitMaster Full-Circle Livestock, Manure, Soil/Plant System

Dr. Jim Ladlie, ProfitProAG President, will discuss how to achieve enhancements to the cycle of livestock/crop production and business performance.

For more information visit www.profitproag.com and click on "Monthly Teleconference."

DIRECTIONS FOR CALLING IN

- 1. Dial the toll free number **1-855-212-0212** at 8 p.m. **SHARP** (Central Time) to get in from the beginning.
- 2. Enter the meeting ID No. 769-100-082# (pound or hashtag key).
- 3. All calls will be muted when joining the teleconference.
- 4. To ask a question during the Q & A portion of the program, press *6 (star six). After asking the question please press *6 to re-mute your phone.
- 5. **NO FEE** or pre-registration required.
- 6. Access the teleconference anytime between 8 to 9 p.m. (CT)



We've taken our monthly teleconference and created two half hour podcasts to be listened to at anytime on any device. The podcasts will be available on soundcloud using either the manure master or the profitproag channels

ProfitProAG https://soundcloud.com/user-331466437 Manure Master https://soundcloud.com/user-873513634

outtil

Base Dry Plant Nutrient Products

Soft Rock Phosphate (SRP)

- SRP (prill) (dry) (0.5-24-0.5-31Ca + trace elements) available in 2,200 lb tote
- Application rate: 150 to 450 lbs/Acre
- Provides calcium, phosphorus and 55 trace minerals
- 3 to 5 year breakdown in soil—one of the best ways to build soil nutrient levels
- Naturally mined product from Idaho
- Can be approved for Organic Use

Elemental Sulfur (E.S.)

- E.S. (prill) (dry) (95-98% S) available in 2,700 lb super tote
- Application rate: 100 to 200 lbs/Acre
- 3 to 5 year breakdown in soil
- Naturally mined product from Canada
- May reduce tight, sticky soils
- Can be approved for Organic Use

Potassium Sulfate K₂SO₄

- Potassium Sulfate (prill) (dry) (0-0-50-18S) available in 2,000 lb tote
- Application rate: 50 to 100 lbs/Acre
- Provides sulfur needed for seed fill
- Choose either Conventional or Organic

Pelletized Lime

- Pelletized Lime (prill) (dry) (0-0-0-36Ca)(CaCO₃)
 - · Fertilizer pellet for faster breakdown than ag lime
 - Pure form—98% calcium carbonate
 - · Can provide an immediate impact on soil pH
 - · Applies evenly and consistently
 - OMRI Listed

Pelletized Gypsum

- Pelletized Gypsum (prill) (dry) (0-0-0-23Ca)(CaSO₄)
- · Fertilizer pellet for fast breakdown, quick availability
- Contains 17% sulfur needed during crop reproduction
- Reduces surface crusting
- Improves soil aeration and structure
- · Can reduce sodium and magnesium in soils
- OMRI Listed

Humates

- Granular humates application rates: between 75 and 150 lbs/A (250 lbs/A for first application on low humus soils)
 - Also available in liquid and soluble powder
- Helps improve soil structure, soil tilth, root growth, water infiltration, aeration and reduces erosion
- Acts as a chelator—more nutrients available
- Stimulates soil biology—especially beneficial fungi
- May help degrade pesticides in the soil
- Naturally mined from New Mexico
- Contains 50% humic acid and 20% fulvic acid
- Can be approved for Organic Use

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ProfitCoat PB **Organic Seed Nutrient and Biological Inoculant**

GENERAL INFORMATION:

ProfitCoat PB is a dry organic seed coating that promotes uniform emergence, increased seedling vigor, enhanced root health and standability throughout the growing season. It contains beneficial microorganisms that will colonize the germinating seedling root and boost the biology in the rhizosphere. The consortium of beneficial bacteria and fungi fix nitrogen, improve availability and solubility of plant nutrients in addition to enhancing the plant's health. The coating contains a seed lubricant and up to 75 trace elements to support the microbes and seedlings during initial stages of growth. ProfitCoat PB is recommended for use on all plant seeds. ProfitCoat PB is a "seedling and season-long plant health enhancement system."

INGREDIENTS:

Contains beneficial plant microbes (including mycorrhizae), micronized natural organic ores, plant nutrient solubilizer, a microbial stimulant and seed lubricant.

APPLICATION RATES:

Apply the following dry ounces of **ProfitCoat PB** per 50 lbs of seed:

- Corn at 2.0 oz (80 K unit)
- Soybeans at 1.0 oz
- Small Grain at 1.0 oz
- Grasses at 2.0 oz • Alfalfa/Legumes at 2.0 oz
- Cover/other crops at 2.0 oz
- **On-seed delivery system to enhance plant health.** ProfitCoat PB contains NO Genetically Modified Organisms (GMOs).

KEEP OUT OF REACH OF CHILDREN AND ANIMALS

Soybean Inoculant: Organic Soybean Inoculant (OSI) can be applied in combination with ProfitCoat PB at 0.5 oz per 50 lb unit of seed.

Scoop included and holds approximately 1.0 oz. Two scoops (2.0 oz) treats 80,000 (80 K) kernel bags of seed corn.

DIRECTIONS FOR USE:

Preplant application: Seed can be pretreated up to six months prior to planting. Mix until uniform seed coverage is obtained.

Planter box application: Measure appropriate amount of **ProfitCoat PB** and sprinkle onto seed in the planter box. It is best to treat in one bag (80 K seeds) increments to insure uniform distribution of **ProfitCoat PB** on the seed. Mix until uniform seed coverage is obtained.

Bulk applications: Apply manually or mechanically by dispersing ProfitCoat PB into a flowing stream of seed. Ensure that **ProfitCoat PB** is evenly dispersed in the planter.

Compatibility: **ProfitCoat PB** is compatible with many common seed fungicides and insecticides.

CAUTION: ProfitCoat PB may be used either on untreated seed, or seed that has been treated with a fungicide or insecticide. Wear appropriate protective gear, avoid skin contact or breathing of dust and follow the caution statements of the other treatments if the seed has been pretreated. Individuals allergic to molds and/or fungi should take precautions to avoid contact with the eyes or skin. To minimize risk of allergic exposure, individuals should wear standard protective clothing and equipment including gloves, safety glasses and a NIKOS approved respirator. In case of allergic contact with eyes or skin, immediately flush the exposed area with water. Seek medical attention if irritation develops or persists.

STORAGE AND HANDLING:

Keep product dry. Store out of direct sunlight. Store below 90° F.

ProfitCoat PB is made with organic compliant materials and can be approved by organic certifying agencies for USDA-NOP programs. As with any organic crop input, growers must contact their organic certifier and get pre-approval of any seed coating additive to be used in their organic cropping system. Because of differences among the various certifying agencies and differences between NOP/EU/JAS/COR ingredient lists, we cannot guarantee that our products will be allowed by your certifier on your farm.



Made in the U.S.A.

PROFTT PROD More From Every Acre . . . More From Every Animal

ProfitProAG's Biological Seed Coating System

Below is a brief synopsis and function for each microbe group in the biological seed coatings.

Mycorrhizal Fungi

- Form on the root system of most plants.
- Most agronomic crops can support mycorrhizae.
- The fungi will form small hyphae (like tiny fingers) that are smaller than root hairs, but can extend further than root hairs to obtain moisture and nutrients, especially phosphorus, for the plant.
- The Mycorrhizae also give off beneficial enzymes and proteins for the plant.
- The plant provides the mycorrhizae with carbohydrates and sugars that the fungi use for energy.
- Mycorrhizal fungi is the main way that trees survive in a forest. While the fungi scavenge for nutrients and water, the tree supplies the mycorrhizae with carbon from sugar for energy.
- They contribute to producing a larger and healthier root system.

Other fungi

- Infect and attack predator pathogens that are harmful to the plant.
- Will colonize the root and protect it from pathogens.
- Works similar to Mycorrhizae in that it finds nutrients and moisture and supplies the plant with enzymes, organic acids and proteins while the plant supplies the fungi with carbon from plant sugars.
- Contributes in the production of a larger and healthier root system.

Bacteria

- Well adapted and can handle many different environments and stresses including non-aerated, tight soils.
- They grow rapidly, proliferate and utilize seed and root exudates (aka carbon in the form of sugar).
- They colonize and multiply in the rhizosphere and the interior of the plant.
- They produce bioactive metabolites including antibiotics and growth-promoting chemicals.
- They compete aggressively with other pathogens and protect the plant from infection.
- Will trigger SAR (systemic acquired resistance), which activates the plant's defense mechanism to kick in and help fend off the pathogen.
- They colonize the root and compete with other pathogens and even prevent them from attaching to the root system.
- A form of actinomyces and produce the earthy smell of soil.

Nitrogen-Fixing Bacteria

- Free-living, nitrogen-fixing bacteria in the soil.
- Harvest nitrogen from the atmosphere and fix it into plant-usable ammonium ions.
- The plant and the Azotobacter work symbiotically together. The plant supplies the Azotobacter with sugars and ATP (adenosine triphosphate or the energy that the plant produces) while the Azotobacter supplies the plant with N.

What else does the seed coating have?

- Supplies nutrients that are needed for the microbes to fully function and thrive.
- Includes a biological solubilizer and stimulant.
 - The solubilizer breaks down the nutrients into a soluble form so that the microbes can use them.
 - The stimulant activates the microbes and boosts them up!







GroPAL[™] is a highly concentrated ocean water concentrate that undergoes a number of natural solar concentration processes where the sodium levels gradually reduce and leave an ionic solution low in sodium, yet packed full of other minerals and trace elements.

These bio-essential building blocks of life are missing in many types of soil. GroPAL infuses these essential nutrients back into the soil, the plant and the ecosystem.

Minerals and equally important trace elements have an absolutely remarkable effect on soil and plant health. They are an enzymatic activator, growth stimulator and a catalyst in the formation of all other nutrients in plants.

Naturally balanced by nature, GroPAL is safe, nutrient dense, OMRI listed and a viable alternative to chemicals. Additionally, GroPAL helps maintain

Guaranteed	Soluble Potash (K20) 2.0% Magnesium (Mg) 5.4% 5.4% Water Soluble Magnesium (Mg) 5.4%
	Sulfur (S)
0-0-2	Chlorine (Cl) 18% Derived From: Ocean Water

DIRECTIONS FOR USE:

Typical Application Rates. Apply In-row, Foliar, Drip Line or directly on soil.

Fruit, Row Crops, Vegetables, Grass – 1/5 to 1 gal per Acre Trees – 1/2 to 1 gal per Acre

Applications vary accordingly to plant size, climate conditions, soil type, crop type and desired results. For most applications, dilute with water for a 10 to 20 gal per acre tank mix. For Trees, dilute to a 15 to 200 gal per acre mix.

Mix GroPal into your water first, then add in other items you are spraying.

and enhances soil quality over time under sensible and sustainable soil management programs.

GroPAL for agricultural use

GroPAL is a cost effective and safe way to ensure that your soil and plants have access to invaluable minerals and trace elements that may be lacking in many soils and neglected by traditional fertilizer producers.

GroPAL reintroduces TRACE ELEMENTS long since lost or reduced from soil.

- Accelerates seed germination
- Ionic = Maximum nutrient absorption
- Promotes robust root and plant growth
- Promotes disease resistance
- Promotes pest resistance
- Promotes soil activity and helpful soil microbes

Gallon for gallon, **GroPal** is nature's most **nutrient dense**, **full spectrum** lonic Mineral and Trace Element solution available for agricultural use.

Don't mix GroPal directly with other chemicals.

GroPal is not compatible with many NPK fertilizers and other chemicals. **Always jar test.**

To avoid burning, do not spray during the heat of the day or in bright sunshine.

ProfitPro, LLC makes no warranties of any kind, expressed or implied with respect to GroPal.

Information regarding the contents and levels of metals in this product is available on the internet @ http://www.aapfco.org/metals.htm

A Product of Australia

PROFIT PROAG More From Every Acre . . . More From Every Animal

MOLYBDENUM 3%

GENERAL INFORMATION:

Molybdenum 3% is very essential for nitrogen conversion to amino acid and especially essential for nitrogen-fixing bacteria. Molybdenum deficiency is associated with low pH soils and sandy soils. A soil and tissue test is always recommended.

Molybdenum 3% is an advanced generation of plant nutrients to enhance nutrient availability and uptake by the plants.

Molybdenum 3% plant nutrients are recommended for use on all plants. Molybdenum 3% is intended to supplement and enhance a full fertilization program as recommended in accordance with a reliable Soil and Tissue Analysis. Molybdenum 3% provides a source of an immediately available nutrient but will not, by itself, provide all necessary nutrients required during the growing season.

GUARANTEED ANALYSIS:

Molybdenum (Mo) 3.0%

Derived from ammonium molybdate.

DIRECTIONS FOR USE:

Molybdenum 3% is designed for soil (at-plant, sidedress or with preemergence application) and foliar application and injection through chemigation and sprinkler systems. Consult with a soil and crop specialist for specific usage rates and application methods.

Application with Nitrogen: Preferably **Molybdenum 3%** should be mixed with nitrogen fertilizers at the rate of 2.5 to 5 gallons per 1,000 gallons UAN 28% or 32%. Apply nitrogen as recommended by soil and tissue tests.

Foliar Application: Apply the recommended amount of Molybdenum 3% in at least 10 to 25 gallons water per acre.

Corn: Apply **Molybdenum 3%** with starter or nitrogen fertilizer to assist in nitrogen metabolism and nitrogen use efficiency. Recommended rate is 0.5 to 4 ounces per acre.

Soybeans: Molybdenum 3% is very effective as a seed treatment at the rate of 1 ounce per acre mixed thoroughly with the seeds. **Molybdenum 3%** aids symbiotic bacteria in nitrogen fixation. Recommended rate is 0.5 to 2.5 ounces per acre.

Grain Crops: Apply at the rate of 0.5 to 2 ounces per acre foliar at flag leaf sheath opening or before early boot stage.

Sprinkler Irrigation: Apply at the rate of 1 to 4 ounces per acre with irrigation water. Inject **Molybdenum 3%** half an hour before end of irrigation cycle.

Compatibility: Molybdenum 3% is compatible with most fertilizers and registered pesticides. However, a compatibility jar test and small plot test is recommended before large-scale treatments are started. Always refer to product label.

Warning: This fertilizer contains Molybdenum and is for use on soils that respond to Molybdenum. Crops high in Molybdenum are toxic to grazing animals (ruminants). Do not exceed the recommended rate.

Read the label carefully before use.

KEEP OUT OF REACH OF CHILDREN AND ANIMALS

Made in the U.S.A.



Nutrient Uptake and Partitioning by Industrial Hemp

John Heard, Keith Watson and Jeff Kostiuk, Manitoba Agriculture, Food and Rural Initiatives John.He

Background

Industrial hemp is grown under license in Canada for seed and/or fibre. Total Canadian production in 2006 was 50 770 acres with 28 960 acres in Manitoba. Little local information exists on the fertility needs of the crop, and removal amounts may differ greatly whether grown for seed alone or for fibre The following study was initiated to track nutrient uptake through a growing season, to observe partitioning within the plant and to establish removal amounts.

Dual purpose hemp is combined with the cutter bar raised to remove the top portion of the plant and leaving much of the stalk. The remaining stalk is swathed and allowed to "rett" or weather on the ground to separate fibres from other stem tissue before baling (see photographs below).



Method

A commercial 160 acre hemp field in northwestern Manitoba near Dauphin was selected for the study. The soil was a moderately well drained Gilbert sandy loam. The field had previously been cropped to oats and alfalfa hay

The cultivar USO 31 was seeded on May 12, 2007 at 35 lb/ac with a zero-till air seeder in 10" wide rows with a 3" wide seed spread. The previous fall 135 lb K₂O/ac was broadcast followed by 60 lb N, 33 lb P_2O_5 and 10 lb S/ac in a mid-row band at seeding. Combine harvest of the entire field on September 19 averaged 950 lb/ac of clean seed.

Plants were sampled from a 3 m row length on a 2-week schedule (see figures below) in a RCBD sampling pattern with 2 replicates. Above-ground parts were sampled, partitioned, dried, chopped and ground for nutrient analysis by ALS Labs. Flower material was considered the reproductive portion of the head and the chaff after threshing the seed. The August 9 sampling had excessive leaf loss in handling and data is not shown here. Fallen leaves were captured for later sampling dates.





Primary nutrient uptake







Secondary nutrient uptake



Dry matter (DM) accumulation Total biomass exceeded 11500 lb/ac with a grain yield of 927 lb/ac with a harvest index of 8.6% Greatest rate of DM accumulation was in late July at 365 lb/ac/day Rate of biomass accumulation slowed in August during flowering, with high temperatures and moisture stress. Some leaf senescence was observed.

> Male plants (about 10% of stand) cease growth and senesce after flowering.

Total nitrogen (N) uptake was 180 lb/ac with 36 Ib N/ac in the grain

Maximum rate of N uptake was 6.0 lb N/ac/day during rapid vegetative growth in late July. •Some 53 lb N/ac disappeared from vegetative

tissue between flowering and maturity with 35 lb N/ac moving into the seed.

Total phosphorus (P) uptake was 42 lb P2O5/ac with 40% in the grain

•Rate of P uptake was 1.4 lb P₂O₅/ac/day in late July and later accumulated in grain at 0.54 lb P2O5/ac/day.

The rate of potassium (K) uptake during vegetative growth in July was 5.4 lb K₂O/ac/day. The greatest K uptake was 188 lb K₂O/ac in late July at the start of flowering. By maturity. K content had declined by 59 lb K2O/ac with only 9 lb K2O/ac removed in the grain

S/ac with 20% in the grain

leaves to the grain.

expected

seed.

•S appeared to be translocated from

Calcium (Ca) uptake was greater than

•Most Ca was present in leaves (53%), stem (33%) and flower (12%)

Greatest magnesium (Mg) uptake was 52 lb Mg/ac with 8% in the grain.

with very little accumulation in the

Total sulphur (S) uptake was 12.5 lb

Micronutrient uptake 13 27 30 24-14 14 Aut Aut Micronutrient uptake was small with Fe >Mn>B>Zn>Cu

Iron (Fe) appeared to increase through grain fill but is likely a result of soil contamination on fallen leaves

-Zn and Cu appeared to translocate from vegetative tissue and accumulate in the seed, whereas Mn, Fe and B remained in vegetative tissue.

Influence of retting on nutrient removal

For fibre harvest, the stalks are swathed and left in the fields to "rett" or for fibres to loosen. During this weathering process nutrients may be leached from the stalk into the soil. The following table shows the yield and nutrient content of hemp stalks sampled from this field. It is apparent that despite high uptake of potassium, very little is actually removed when hemp is allowed to rett in the field.

Stalk sample	Stalk	Nitrogen	Phosphorus	Potassium	Sulphur
and and form	Lb/ac	Nutrient Content (%) and Amount (lb/ac)			
September 7	7730 lb/ac	0.87 %N	0.07 % P	0.97 %K	0.07 %S
Standing		67 lb N/ac	13.2 lb P ₂ O ₅ /ac	90 lb K ₂ O/ac	5.0 lb S/ac
October 16 Standing 126 cm	4060	0.62 %N 25 lb N/ac	0.05 %P 4.6 lb P ₂ O ₅ /ac	0.54 %K 26 lb K ₂ O/ac	0.07 %S 2.8 lb S/ac
October 16 Retted	Assumed 4060	0.72 %N 29 lb N/ac	0.06 %P 5.5 lb P ₂ O ₅ /ha	0.11 %K 5.3 lb K ₂ O/ac	0.06 %S 2.4 lb S/ac

Discussion

The magnitude of nutrient uptake was similar to that observed in earlier Manitoba studies (1.) The rapid hemp growth that occurred in July caused most nutrients to be taken up at high rates. Nutrient accumulation slowed after this period for a number of possible reasons:

Male plants comprise about 10% of the population and they cease growth and senesce after pollination Several days exceeding 30°C and low soil moisture occurred in early August leading to some lower leaf senescence. Not all senescing leaves may have been captured during

our sampling. Stalk growth generally slows during flowering but resumes during seed development.

Although the hemp crop takes up a considerable quantity of nutrients, most remain in the stalk owing to the low harvest index and a low amount is removed in grain (the exception being P). With the retting process in the field, the majority of the potassium taken up and apportioned in the stalk

appears be leached out. This does have some agronomic implication as potassium is concentrated under swaths

References

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