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AG Talk Report

UNIVERSITY OF IDAHO, U.S. DEPARTMENT OF AGRICULTURE, AND IDAHO COUNTIES COOPERATING

INSIDE THIS ISSUE

Ag Talk Tuesday resumes in 2022

Organizers: Kasia Duellman, Pamela J.S. Hutchinson, Juliet Marshall, University of Idaho

Thanks to all who participated in another successful year of Ag Talk Tuesday. Your input and participation make these online, LIVE sessions extraordinary. In 2021, we heard from agronomists, crop consultants, growers and other ag professionals from around the region and we enjoyed Featured Topics from guest speakers from the private sector, and from the University of Idaho and other public arenas. We kept up on drought conditions as they unfolded throughout the season, along with weed, plant pest and plant disease problems spanning crops like alfalfa, small grains, sugarbeet, onion and potato. We even learned about alternative crops, such as teff. This forum is a great way to engage with the Ag Community. Tune in during your lunch break or while at work—in your tractor, pickup, or shop. Wherever you are, you can participate LIVE by phone or by Zoom (the app we use for the Ag Talk Tuesday sessions).

Visit our website, https://www.uidaho.edu/ag-talk, for more information on Ag Talk Tuesday and how to participate. You can also view recordings of past sessions.

Ag Talk Tuesday Schedule for 2022 - First and Third Tuesdays, May through August, 11:00 AM

Save the Dates:

May 3
May 17
June 7
June 21
July 5
July 19
August 2
August 16

University of Idaho Extension

A Statewide and County Drought – Implications for Agricultural and Ranching Operations in Your County

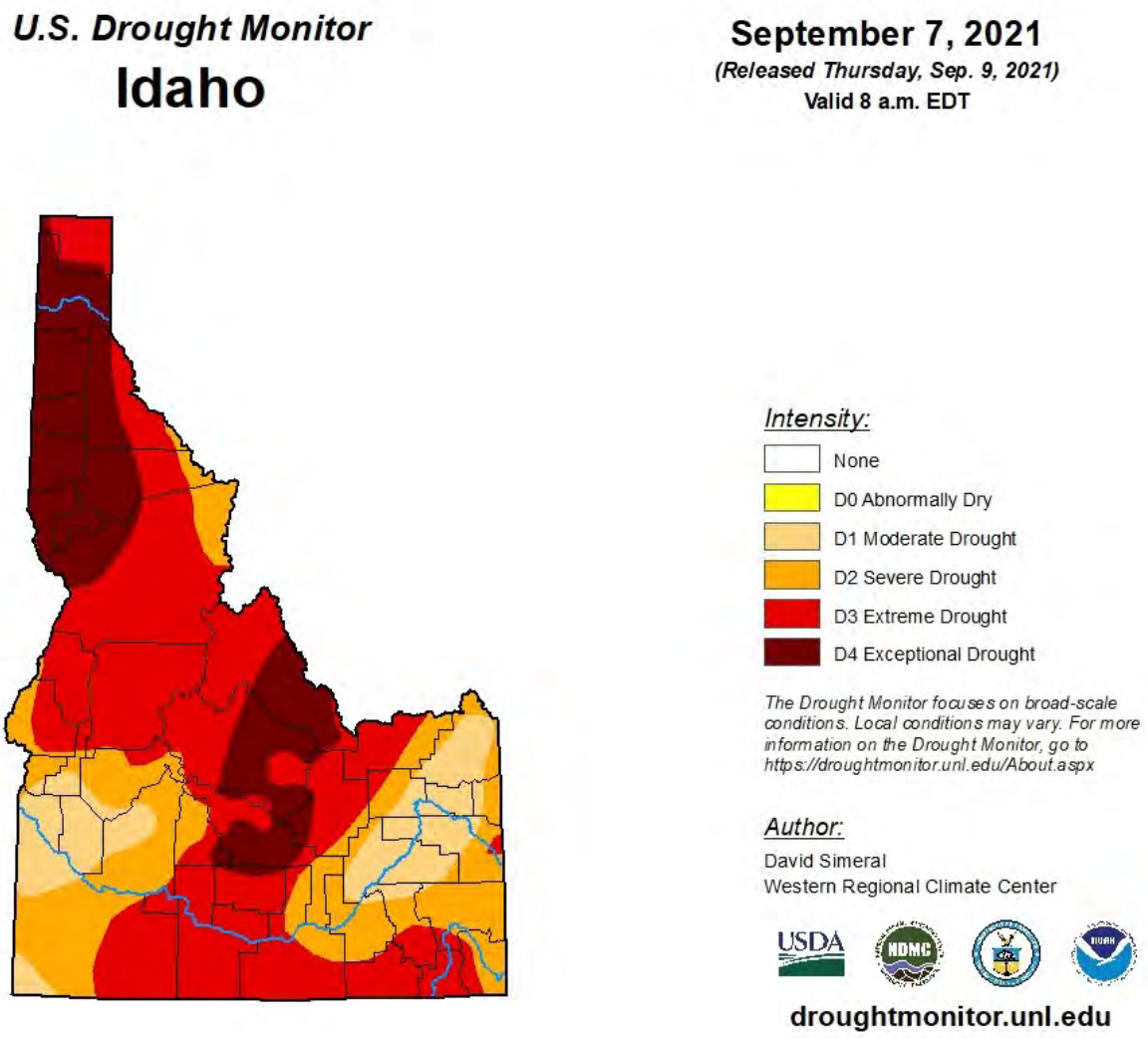
Brad Stokes – UI Extension Elmore County Educator

It's no secret that the state of Idaho the entire western United States are experiencing a drought this year. Snowpack levels, precipitation events, surface water reservoirs and our ground water aquifer have been impacted thus far. A drought could be classified as a period of prolonged shortage in the water supply due to below-average natural precipitation which affects surface and/or ground water for use by landowners, municipalities, agricultural or ranching operations.

Drought and the conditions that contribute to it is overseen by a statewide committee, the Idaho Drought Committee, which is composed of numerous scientists, hydrologists and climatologists from multiple organizations throughout Idaho. These experts weigh-in and discuss historical and current data concerning streamflow, soil moisture, precipitation events, forecasts, reservoir and aquifer levels to give each area (or county) a recommendation to the National Oceanic and Atmospheric Administration (NOAA) and United States Department of Agriculture (USDA). Designations of drought may range from none to the extreme D4 status. Drought statuses and impacts are categorized and described in the table below. As for the most current Idaho Drought Map (September 7, 2021) a severe drought is occurring statewide and may affect your local agricultural or ranching operations (Figure). Not surprisingly the entire state of Idaho is experiencing some level of drought, with the most extreme designations occurring in northern and central Idaho counties (D4).

Table. Drought Classification Scheme. Table credit – National Drought Mitigation Center website (University of Nebraska Lincoln, August 4, 2021).

			Ranges				
Category	**Description**	**Possible Impacts**	**Palmer Drought Severity Index (PDSI)**	**CPC Soil Moisture Model (Percentiles)**	**USGS Weekly Streamflow (Percentiles)**	**Standardized Precipitation Index (SPI)**	**Objective Drought Indicator Blends (Percentiles)**
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2



Drought events can have several types of impacts upon the area including economic, environmental and social. Agricultural operations may lose money if a drought destroys their crop, they cannot plant or if they must spend more funds on irrigation or drilling new wells for pivots. Ranchers may lose money if they must spend more funds on feed (hay/alfalfa etc.) and water for their animals, or if their cattle are removed prematurely from grazing areas because lack of forage/grasses. Environmental impacts of drought include loss of habitat (plant/wildlife/animal/wetland/fish), lack of food, lack of drinking water, increases in diseases, different migration patterns, increased stress on endangered species (even up to extinction), wind and water caused soil erosion and direct increases of wildfires. Social impacts of drought can include anxiety, depression, health (poor water quality and lung problems related to dust), public safety threats (forest/range fires), reduced incomes and fewer recreational opportunities or activities.

This author has been actively monitoring the drought status in Elmore County, as well as sitting on the Idaho Drought Committee, since early March of last year. Counties may author and vote on Drought Resolutions/Declarations of Emergency for areas. These Resolutions ask that under Idaho Code 42-222(A) that the Governor of the State of Idaho and the Director of the Idaho Department of Water Resources (IDWR) declare a drought emergency for the requested county and that administrative actions are enacted to lessen the impacts of drought conditions upon the constituents and those that may be directly or indirectly impacted by these conditions.

Teff: An Overview

Nutritional benefits, Production practices, and Current market scenario

Authors: Ritika Lamichhane (Graduate student, UI Plant Sciences) & Olga Walsh (Associate Professor, Extension Specialist — Cropping Systems Agronomy)

Nutritional benefits

Teff (*Eragrostis tef*) is a native Ethiopian grain crop originating between 4000 B.C. and 1000 B.C. It is gaining popularity in the United States as a nutritious grain, and a high-quality forage crop.

Nutritionally packed Teff grain contains 9-11% protein, 80-85 % carbohydrates, 73% starch, and 4.4% lipids. The majority of teff lipids were found to be unsaturated which is important for a healthy diet. These fats help to reduce risk of heart disease and lower cholesterol levels. Teff grain also contains substantial levels of vitamins A, B, and C and major essential amino acids such as leucine, valine, proline, alanine, and glutamic and aspartic acids. Compared to other cereal grains, teff is richer in iron, calcium, zinc, and magnesium. The absence of gluten makes teff popular among individuals suffering from Celiac disease (gluten intolerance). Teff's slow-release carbohydrate constituents make it useful for diabetic patients. Teff grain is also rich in bran, an important source of fiber.

Table 1. Nutritional benefits of teff in comparison with other cereal crops.

	Teff	Maize	Sorghum	Wheat	Rice
Energy (kcal)	357	375	370	359	357
Starch (%)	73	72	63	71	64
Crude protein (%)	11	8-11	8.3	11.7	7.3
Amino acid (g / 16 g N)					
Lysine	3.7		0.3	2.1	3.7
Isoleucine	4.1		0.7	3.7	4.5
Leucine	8.5		2.1	7.0	8.2
Valine	5.5		0.8	4.1	6.0
Phenylalanine	5.7		0.9	4.9	5.5
Tyrosine	3.8		0.7	2.3	5.2
Tryptophan	1.3		0.2	1.1	1.2
Threonine	4.3		0.5	2.7	3.7
Histidine	3.2		0.4	2.1	2.3
Arginine	5.2		0.6	3.5	8.5
Methionine	4.1		0.3	1.5	2.7
Cystine	2.5		0.3	2.4	1.8
Asparagine	6.4			5.1	9.0
Serine	4.1		0.8	5.0	5.0
Glutamine + Glutamic Acid	21.8			29.5	17.0
Proline	8.2		1.3	10.2	5.0
Glycine	3.1		0.5	4.0	4.5
Alanine	10.1		1.6	3.6	5.5
Crude fat (%)	2.5	4.9	3.9	2	2.2
Total polyunsaturated fatty acids	1.1	1.8	1.4	0.5	0.8
Linoleic acid (LA)	0.9	1.7	1.3	0.5	0.78
α-linoleic acid (ALA)	0.14	0.05	0.07	0.03	0.03
LA:ALA ratio	7:1	34:1	20:1	17:1	26:1
Crude fiber (%)	3.0	-	0.6	2.0	0.8-1.0
Total dietary fiber	4.5	2.6			-
Soluble dietary fiber	0.9	0.6			-
Ash (%)	2.8	1.4	1.6	1.6	1.4

Sources: Agren & Gibson 1988; Bultosa & Taylor 2004; FAO 1992; Gebremariam et al. 2012; Hager & Arendt, 2013; Juliano 1993; Kebéma 1987; Michaelsen et al. 2011; Mossé, Huet, & Baudet 1985; Shoup et al. 1969; USDA/ARS. 2014; Wolter et al. 2013.

Teff grain is ground into flour, used to make cakes, biscuits, cookies, bread, muffins, and pasta. Teff is best known for its use in making injera, a spongy Ethiopian flatbread. They are also used for brewing gluten free lactic-acid beverages. Apart from serving as a healthy food source for humans, teff preferred as a forage crop by animals, especially horses. Teff can be grown for dry hay, silage, or pasture. Additionally, teff grain is used to produce antioxidants and fat replacers.

Figure 1. Maskal teff grain flour by The Teff Company, Idaho (left); Ethiopian flatbread injera (right).

Production practices

Teff is a reliable low-risk crop. It is relatively resistant to biotic and abiotic stresses and can be grown under moisture stress or waterlogged conditions. Its short production cycle makes it useful as a rescue or catch crop in areas with limited water availability when perennials have failed. Growing teff as a double crop, green manure crop, cover crop or even an emergency crop when the unfavorable weather conditions delays planting of other grain crops is an excellent option. Teff is often grown as an economically viable rotational crop that's compatible with a variety of commodity crops. It's shallow root system makes crop rotation following teff relatively easy and efficient. Teff, a warm season crop, grows poorly in cold temperatures and dies in freezing temperatures. It is grown from early-mid May to late August in Idaho's unique semi-arid condition. Planting density of 3lb/acre with 1 ft spacing is considered appropriate. As there are no teff-specific nutrient management guidelines for Idaho, the growers are following wheat fertilizer recommendations. Planting teff after crops with high nutrient demands like potatoes and sugar beets is a sensible way to utilize the nutrients left over in the soil after previous harvest. While talking about the water management, 18 inches of water throughout the season is considered good for growing teff. There is no specific irrigation practice followed in Idaho, irrigation method varies pivot system to flooding and dryland. In comparison to other cereal crops, disease and pest problems have been seldom observed in teff. Weeds are a major problem in teff production as there are only a handful of herbicides that are approved for its weed management. Planting teff early and controlling weeds at the start of the season helps to maintain the teff fields free of weeds once the teff canopy closes. Harvesting and handling of teff can be challenging due to its minute grain size. With a length of 0.9-1.7 mm and width of 0.7-1 mm, 150 teff grains' weigh equals to that of just one wheat grain. In Africa, teff is primarily traditionally threshed with the help of sheep, and then harvested by hand; significant grain loss is a common occurrence at harvest. The US farmers typically swath the teff grain at maturity, then combined once dried.

The Idaho's Snake River Valley's climate (hot summers and intense sunlight) is remarkably similar to that of East Africa, where teff originates. This makes Idaho the perfect place to grow teff. With fertile soils and ecologically sensitive farming practices, some of the best quality teff in the world is produced in Idaho.

Figure 2. Teff grown by the Teff Company, Idaho (left); minute sized teff grain (right).

Current market scenario

According to DataM Intelligence, the world teff market is expected to grow 19.3% by 2027. Globally, Ethiopia and Eritrea (East African nations) are leading teff producers followed by Europe, the Asia-Pacific, South America, and North America. Currently teff is grown in at least 25 states in the US including Idaho, Oregon, California, Washington, Nevada, to name but a few. Idaho producers mainly grow two varieties of teff: brown and ivory. Brown teff has a strong nutty flavor while the ivory is milder and sweeter.

Figure 3. Global teff products market prediction (2020-2027)

Though teff has been successfully grown in Idaho since the 1980s, more research and education on its breeding and management are needed. Mechanization is required to minimize grain loss at harvest and handling. The Cropping Systems Agronomy program at the University of Idaho, Parma, is excited about future collaborative research focusing on nutrient and water management for teff, as well as variety evaluation.

Further reading:

Teff (*Eragrostis tef*) Processing, Utilization, and Further Opportunities: A Review, Roselle Barretto, Rania Marie Buenavista, Jared Lou Rivera, Shuyu Wang, P.V. Vara Prasad, Kaliramesh Siliveru

Teff, A Rising Global Crop: Current Status of Teff Production and Value Chain, Hyejin Lee

RESEARCH UPDATE:

Evaluation of on-farm centrifuge and screen on removing solids and nutrients from liquid dairy

LIDE CHEN, ASSOCIATE PROFESSOR/WASTE MANAGEMENT ENGINEER

Introduction

Idaho has a strong dairy industry and ranks among the top 5 milk producing states in the nation. As a by-product of milk production, large amounts of dairy manure are generated each year. Some Idaho dairies use liquid manure handling systems-either flushing their manure lanes or mixing their milk parlor washing water with vacuumed/scraped slurry manure from their manure lanes-that result in large amounts of liquid manure that are applied via irrigation systems to adjacent cropland during the growing season. Idaho dairymen have realized that separating solids and nutrients from liquid dairy manure is a critical step to improve nutrient use efficiency, reduce negative environmental impacts, and reduce manure handling costs. Most Idaho dairies using liquid manure handling systems have primary screens that separate coarse particles from their liquid streams. A couple of dairies have incorporated secondary solid separation technologies such as centrifuge into their manure handling systems to realize higher solids and nutrients removal rates. Dairymen want to know more information about solid and nutrient separation efficiencies by centrifuges and screens to make informed decisions on upgrading their solid separation technologies. A yearlong evaluation of one on-farm centrifuge and two screens on removing solids and nutrients from liquid dairy manure was conducted

to answer dairymen's call for more information.

What we did

Screen and centrifuge separated solids were collected monthly from a commercial dairy. The commercial dairy mixed their vacuumed slurry manure from alleyways with milk parlor washing water in a receiving pit. The liquid dairy manure was pumped from the receiving pit to a sand lane where some of sands were separated out. After the sand lane, the liquid stream went through two parallel primary screens and then a centrifuge. The solids samples were collected from the screen separated solids pile and centrifuge separated solids pile, respectively at the same time. The collected solids were analyzed for nitrogen (N), phosphorus (P), and potassium (K) by a certified commercial laboratory.

What we have found

Figure 1. Centrifuge separated solids (left) vs. screen separated solids (right).

Apparently, the screens mainly separated coarse undigested fiber while the centrifuge had the capacity to separate much finer solids.

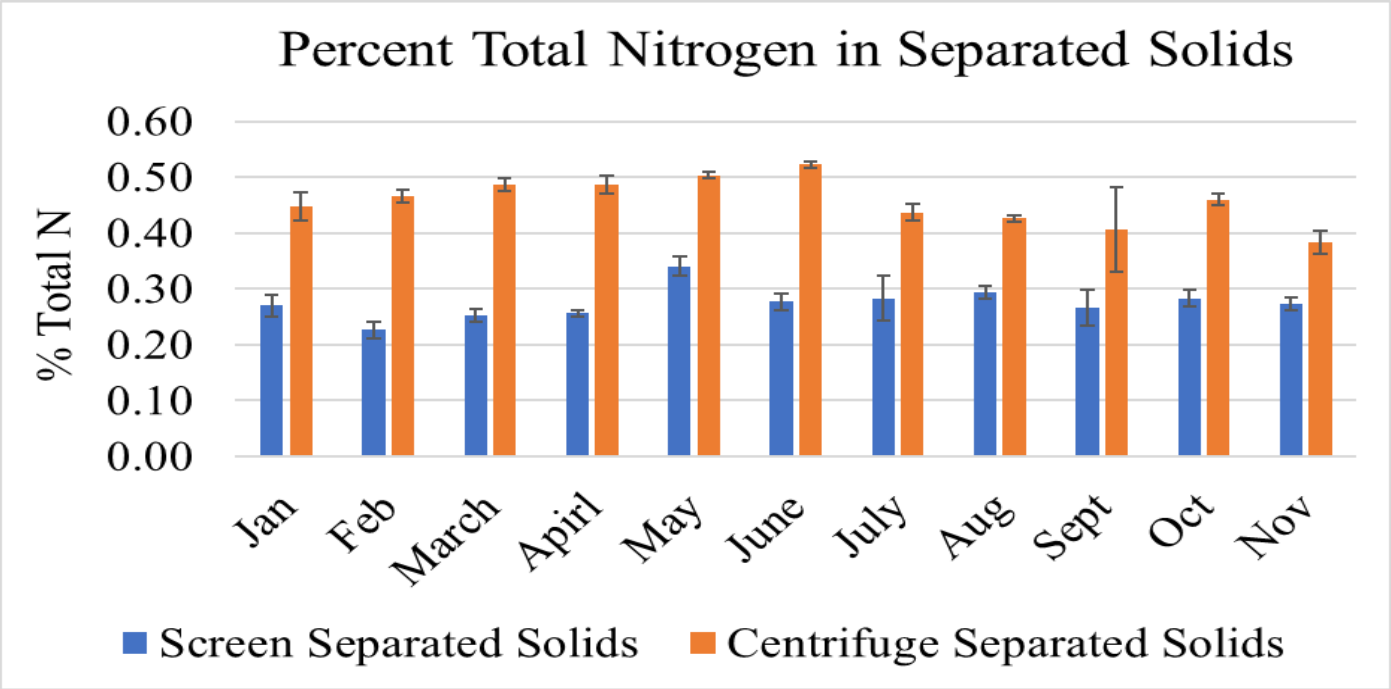


Figure 2. Percent total nitrogen in screen- and centrifuge-separated solids.

A yearlong-average of 9.2 lb/ton of total nitrogen was in the centrifuge separated solids while the screen separated solids contained a yearlong-averaged total nitrogen of 5.4 lb/ton.

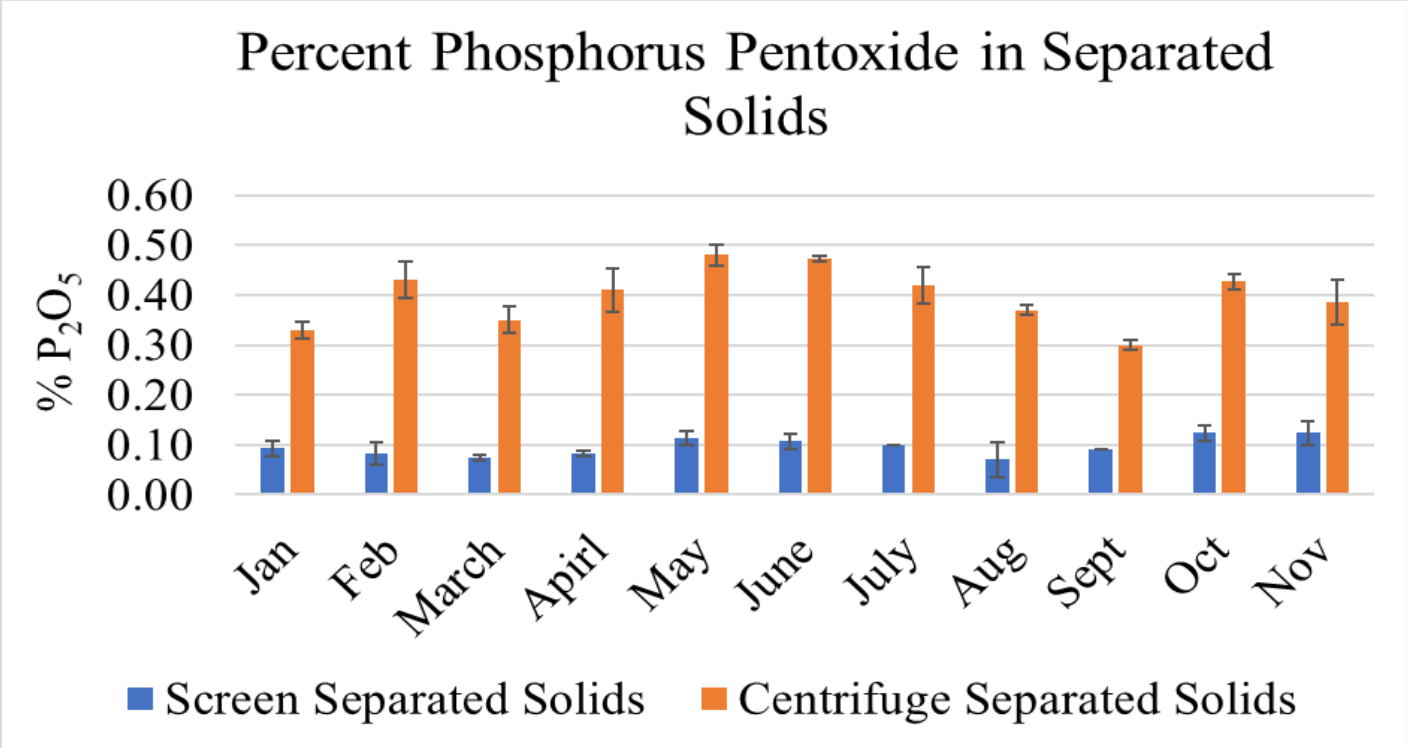


Figure 3. Percent phosphorus (as P_2O_5) in screen- and centrifuge-separated solids.

A yearlong averaged phosphorus (as P2O5) of 8.0 lb/ton and 2.0 lb/ton were found in the centrifuge separated solids and the screen separated solids, respectively.

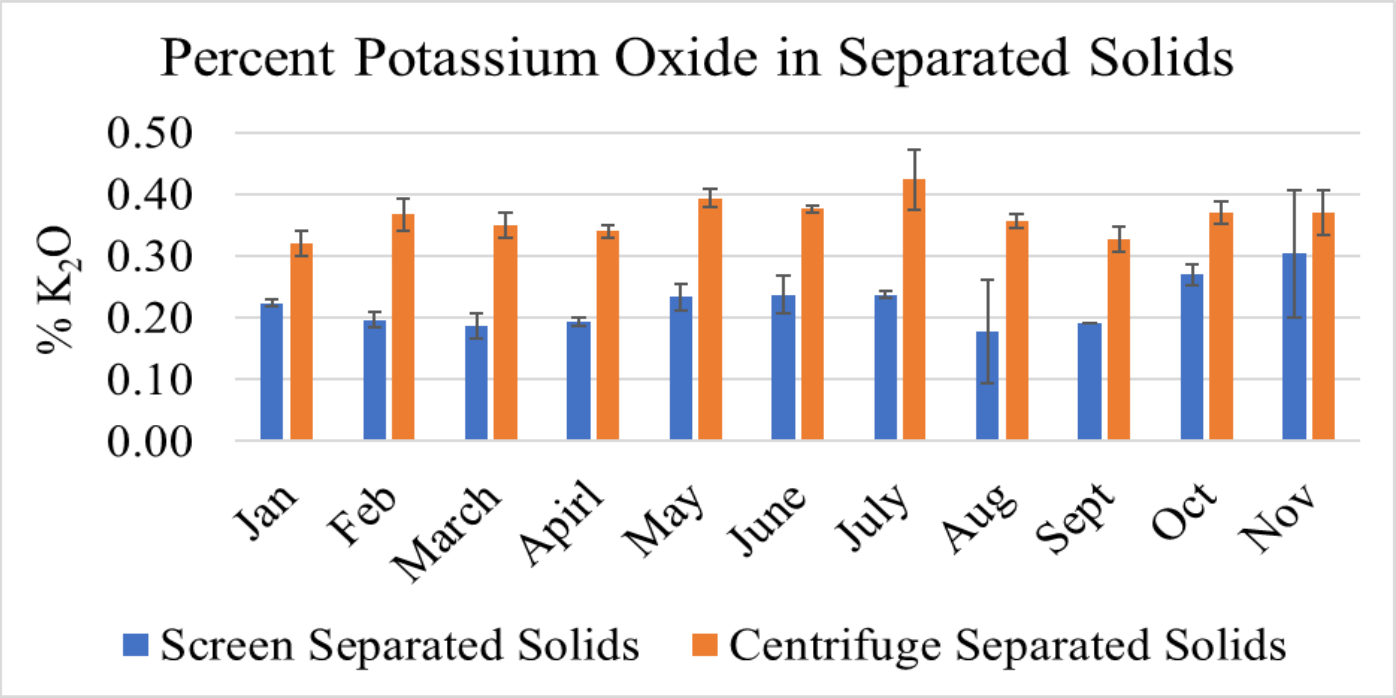


Figure 4. Percent potassium (as K_2O) in screen- and centrifuge-separated solids.

A yearlong averaged potassium (as K_2O) of 7.2 lb/ton and 4.4 lb/ton were found in the centrifuge separated solids and the screen separated solids, respectively.

Summary

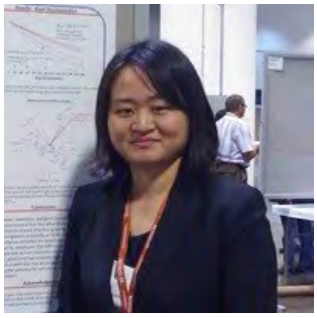
- Centrifuging can further remove finer particles that can not be removed by primary screens.
- Centrifuged separated solids contained higher nitrogen, phosphorus, and potassium, especially phosphorus.
- To separate more solids and nutrients from liquid dairy manure, advanced separation technologies such as centrifugation are needed.

AG Talk Report

Recent featured speakers for Ag Talk Tuesday

Albert Adjesiwor, Assistant Professor, Universit of Idaho is a weed scientist and extension specialist studying and disseminating information on best weed management practices in agronomic crops, mainly: sugarbeet, dry beans, corn and small grains.

Ben Thiel is the Director of the Spokane Regional Office for the Risk Management Agency. The Spokane Regional Office administers aspects of the federal crop insurance program for the states of Alaska, Idaho, Oregon, and Washington by keeping in close contact with local producers, grower groups, universities, and government agencies.



Xi Liang is an Associate Professor at the University of Idaho who leads a Cropping Systems Agronomy program with focuses on crop physiology in response to abiotic and biotic stresses, irrigation management and alternative crop agronomy (e.g., cover crops and quinoa).

Ritika Lamichhane is a graduate student under the guidance of Olga Walsh (Associate Professor, Plant Sciences).

Jenny Durrin is the Director of the University of Idaho Seed Potato Germplasm Program

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