The goal of this monthly newsletter is to serve the best interests of Idaho crop producers. Correspondence and inquiries should be addressed to: Olga Walsh, Cropping Systems Extension Specialist, Southwest Research and Extension Center, 29603 U of I Lane, Parma, ID 83660, Phone: (208)722-6701 (ext. 218), Fax: (208)722-6708, Email: owalsh@uidaho.edu

TOPICS:

WHAT’S NEW?
Southern Idaho Cropping School - Feb 9, Caldwell
Drones in ag - Part 1(of 3)

GUEST CONTRIBUTION
Importance of crop stand establishment - by Kelli Belmont and Jordan McClintick-Chess

GETTING TO KNOW ID AG
The 48th Annual University of Idaho Potato Conference Update - by Kelli Belmont

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WHAT’S NEW?

Nutrients • Water • Weeds • Pests • Specialty Crops
Precision Ag • Unmanned Aerial Systems

University of Idaho

CROPPING SCHOOL
Best Western Plus Caldwell Inn & Suites
908 Specht Avenue, Caldwell, ID 83605
February 9, 2016  8:00 am – 1:00 pm
Cost: $20

Soil & Water Management: 0.5 credit
Integrated Pest Management: 1 credit
Crop Management: 2.5 credits

Host: Olga Walsh, University of Idaho, Parma Research & Extension Center,
owalsh@uidaho.edu, (208)722-6701

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<tr>
<th>8:00 – 8:30 Registration, Coffee/Doughnuts/Welcome</th>
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<td>8:30 – 9:00 Resistant weeds: prevention &amp; solutions</td>
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<td>9:00 – 9:30 Farming in water limiting environment</td>
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<td>9:30 – 10:00 Pest management for ID specialty crops</td>
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<td>10:00 – 10:10 Break</td>
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<td>10:10 – 10:40 Crop disease: lessons and prognosis</td>
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<td>10:40 – 11:10 Precision agriculture tools</td>
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<td>11:10 – 12:00 Unmanned Aerial Vehicles in Agriculture</td>
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<td>12:00 – 1:00 Lunch</td>
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Olga Walsh, PhD - University of Idaho, Cropping Systems Agronomist & Extension Specialist, Parma R&E Center

Don Morishita, PhD - University of Idaho, Weed Scientist & Extension Specialist, Kimberly R&E Center

Jim Barbour, PhD - University of Idaho, Integrated Pest Management Specialist, Parma R&E Center

Phill Wharton, PhD - University of Idaho, Potato Pathologist, Aberdeen R&E Center

Craig Thompson - Take Flight LLC, Nampa/Boise, ID, UAS Application Development/Pilot
Drones in Ag
Part 1 (of 3)

With increased interest of growers, crop consultants and researchers in Unmanned Aerial Vehicles (UAVs) or drones, I am putting together a 3-part article on utilization of drones in agriculture.

Part 1 (this issue) will focus on economic impact, legal and safety regulations to be aware of, when considering incorporating drones in ag operations. Part 2 (February issue) will describe most promising applications of drones for agriculture. Then, Part 3 (March issue), will list some fun facts and occurrences involving drones.

**Economic impact of UAVs**

The economic impact of UAV systems in the state of Idaho is estimated at $29 million for 2015-2017, and $174 million during the 10 years from 2015 to 2025, with a national impact of $82 billion (Association for Unmanned Vehicle Systems International, 2013).

![Figure 1. Projected UAV sales by sector: Red (top) = Agriculture, Blue (middle) = Public Safety, Green (bottom) = Other. Source: AUVSI Economic Report.](image)
2014 was characterized by remarkably rapid increase in UAV sales. Prior to 2014, at least 500,000 UAVs have already sold in the US. In 2015, between 700,000 and 1,000,000 drones were purchased in the US - representing a 63% increase from 2014. About 7% of consumers purchased a drone as a gift during 2015 holiday sales.

In 2015, the proper evaluation of UAVs in crop production could be finally conducted on a larger scale. Prior to 2015, only about a dozen of companies/institutions were approved by the Federal Aviation Administration (FAA) to fly UAVs for agricultural use. By the end of 2015, more than 2,000 entities have received permissions to fly in the US. Drones & Robotics subsector has attracted over $200 million in funding across 24 deals during the first half of 2015 (AgFunder, 2015 Midyear Report), indicating rapid expansion and development of UAV industry.

**Safety**

The U.S. Congress has mandated the FAA to incorporate UAVs into the national airspace by Sept. 30, 2015 (Dolan and Thompson II, 2013), however, the final decision expected in 2016-17.

The US FAA, in collaboration with research institutions, is developing and refining safety guidelines for UAV utilization. Currently, the first in the world “droneport” is being built in Boulder City, Nevada, 30 minutes from Las Vegas. The droneport will serve as the world’s first commercial droneport and teaching facility. This 50-acre center is one of six FAA-approved UAS test sites in the U.S.

![Six FAA-approved UAV test sites in ND, NY, VA, TX, AL, and NV.](image)
Effective December 21, 2015, anyone who owns a small unmanned aircraft (0.55 to 55 lbs) must register it with the FAA’s UAS registry before they fly outdoors. Previously utilized UAVs must be registered by February 19, 2016. Civil and criminal penalties are set forward to stop the use of unregistered UAVs. Registration costs $5, is done on-line, and requires the following information: email address, physical address and mailing address, and requires to have a credit card. The registration is valid for 3 years, and provides registration number/sticker to be placed on a UAV. As it can be seen from the FAA UAV site, if an individual is planning to fly for personal use/fun - all they have to do is register the UAV and follow the safety guidelines.

Safety guidelines (list is not all-inclusive, please visit the FAA UAV site for full and up-to-date information, or contact your local FAA office.

- Operations for the purpose of closed-set motion picture and television filming are not permitted
- UAV must be operated within visual line of sight
  - Stay under 400 feet above ground level
  - May not operate within 5 nautical miles of an airport
  - Comply with UAV-specific air speed manufacturer guidelines
  - Have all documentation ready for inspection at each flight
- Must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight
- If the UAS loses communications/GPS signal - must return “home”
Following the FAA guidelines, the authorization via Section 333 is required for civil/non-government entities to fly the UAV for commercial purposes. Crop producers fall under this specific category, if they intend to fly UAV over their fields for monitoring purposes. This is recognized as enterprise use of UAVs, since the crops are produced to be sold for profit. Section 333 grants the Secretary of Transportation the authority to determine whether an airworthiness certificate is required for a UAS to operate safely in the National Airspace System (NAS).

The rules stipulate that any aircraft operation in the national airspace requires: 1) a certificated and registered aircraft, 2) a licensed pilot, and 3) operational approval. The authorization via Section 333 provides operators a competitive advantage in the UAS marketplace, discourages illegal operations, and improves safety.
Importance of crop stand establishment

by Kelli Belmont with Jordan Mcclintick-Chess

Kelli Belmont - Research Technician, UI Parma R&E Center; Jordan Mcclintick-Chess - Agricultural Technician, UI Parma R&E Center.

“The sins of planting will haunt you all season” (Nielson 2001). What is done during the planting operation is permanent throughout the growing season unless you replant the field. Establishing a good crop stand to attain maximum and uniform germination and emergence directly impacts yield. Variability in stand establishment effects yield potentials in all crops. When looking across an uneven field, there may be tall and short plants, empty gaps within rows, and clusters of crowded plants.

**Pre-plant Management**

Seed bed preparation is an important foundation for the rest of the growing season. The soil should be worked to create a good tilth and fine soil structure, which consists of well-pulverized, free of clods and plant residues. Level soil that is firm will provide good seed-soil contact and results in better germination and emergence, enhanced root growth and good gas exchange. Worn disc openers and misadjusted closing wheels contribute to poor seed-soil contact. Additionally, excessive disking can cause soil compaction and restricts the root zone.

Applying pre-emergence herbicides will provide weed control and reduce competition for resources between weeds and emerging crop seedlings.

Planting early to maximize yield potential can mean germination and emergence of seedlings are exposed to significant stress. Soil temperatures at
planting can be below optimal temperature for emergence. Optimal temperatures for emergence depend on the crop and seed quality. Residue levels effect soil conditions. When soil has high residue, soils are generally cooler and wetter, which slows emergence and increases seedlings vulnerability to disease and insect pressures. Seed treatments are important to protect seedlings and enhance early stand establishment.

Seed quality is critical to stand establishment. Size and shape of the seed should be uniform and have maximum germination rate. Germination is the most significant stage for stand establishment, therefore, having good quality seed with high germination rates are necessary to establish vigorous seedlings.

A starter fertilizer is the placement of nutrients in a concentrated area close to the seed at planting. For example, placing a starter fertilizer band 2 inches to the side and 2 inches below the seed offers some degree of safety to the seed by keeping a barrier of soil. However, some planters have in-furrow application equipment for insecticide, fungicides, and fertilizer. In-furrow placement of starter fertilizer is in direct contact with the seed, which increases the risk of fertilizer damage to the seed especially if the soil is dry.

Preventing Plant Space Variability:

- Match the seed grade with correct planter plates for plate-type planters.
- Inspect for wear on the back plate and brush for planters with finger pickups. Check tension on the fingers with a feeler gauge and tighten if necessary.
- Check for wear on double-disc openers and seed tubes.
- Ensure the sprocket settings on the planter transmission is correct.
- Check for worn chains, stiff chain links, and improper tire pressure.
- Lubricate all chains and grease fittings.
- Clean and clear any obstructions in seed drop tubes.
- If you have a planter monitor, clean seed tube sensors.
- Make sure coulters and disc openers are aligned properly.
- Match air pressure to the weight of the seed being planted with air planters.

Plant emergence variability

Delays in emergence can reduce yields because new plants cannot effectively compete with older, established plants for sunlight, moisture, and nutrients (Carter and Nafziger 1989; Nafziger et al. 1991).

As more viable seeds are sown per m$^2$ proportionately less grow into established plants because adjacent seedlings have to compete more for resources. Figure courtesy of van Herdwaarden et al. 2003.

In corn, delayed emergence generally stunts plant growth and reduce harvestable ears. Delayed in emergence by 10 days scattered throughout the field reduced yield by 6 to 9% and delays of 21 days reduced yields by 10 to 22% compared with uniform emergence in corn (Carter and Nafziger 1989; Nafziger et al. 1991). In order to achieve uniform emergence adequate soil moisture, adequate soil temperature, and good seed-to-soil contact is necessary. Delayed emergence may result from variable soil moisture within the seed depth zone and poor seed-to-soil contact due to soil clods. Additionally, variable soil temperatures, soil crusting prior to emergence, herbicide injury, and variable insect/soil-borne disease pressure contribute to delayed emergence.

The main goal in establishing a uniform stand is to achieve rapid and uniform germination and seedling establishment. Determining the correct seed depth for the appropriate crop may be one of the biggest decisions made in the field during planting. Deciding on seeding depth should be made out in the field rather than in the shop or from previous year’s records because seeding depth is based on current soil moisture and the upcoming weather forecast. For dryland farming, soil moisture is critical to consider when selecting a planting depth. For example, if soil is dry at 1½ inches and the weather is forecasted to remain dry, planting corn at 2 or 2½ inches is a viable option (Nielsen 2001). In dry conditions, germination problems are greater at shallow depths compared with planting deeper. Germination may vary at shallow depths due to the difference in soil moisture. However, in irrigated farming water can be added immediately after planting to ensure uniform and adequate soil moisture for germination.
Check the depth control settings on the planter. Compare the manual’s theoretical planting depth and the actual planting depth for the settings used. Actual planting depth depends on soil conditions and change with soil moisture, therefore, check planting depth every time you start a new day or new field. Ultimately, uneven stand establishment in most crops will result in reduced yields. The first day the seed enters the field will impact the crops ability to emerge and careful management will enhance uniformity within the field. Some potential yield losses can be avoided with even within-row seed spacing and uniform emergence.

References


GETTING TO KNOW IDAHO AG

The 48th Annual University of Idaho Potato Conference Update

by Kelli Belmont

Kelli Belmont - Research Technician, UI Parma R&E Center

The 48th Annual University of Idaho Potato Conference and Ag Expo was held at Idaho State University campus in Pocatello January 20-21. The conference consisted of key topics in the potato industry such as weed, disease, insect, variety, nutrient, water management practices and economics, as well as marketing and political issues. In addition, these topics were discussed in Spanish at presentations in workshops for both days of the conference. When tired of sitting through talks, you could take a break and snack on some delicious French fries which were provided all day long. There were many vendors in the ISU Student Union and the Holt Arena. The Ag Show was held in the Holt Arena and featured equipment ranging from tractors to diggers to pivots and much more.
One topic widely discussed outside the workshops was the Vydate® (oxamyl) shortage for this upcoming season. Many will have to alter pest management practices for nematodes, specifically potato cyst nematodes (PCN), in response to the shortage of nematicides. There are alternative nematicides if fields are infested with PCN or free living nematodes. Using these alternative products will increase costs and is one thing growers are keeping in mind. It is tempting to lower the rates in order to reduce the cost; however, if you have PCN then you need the full label rate to be effective. Overall, the Potato Conference was very informative and a great way to be exposed to many aspects of the potato industry.