UNFS Seeder Set Up Day follow up notes

UNFS

Upper North Farming Systems









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Calculating Seed Application Rates

Accurately calculating seeding application rates will help to produce an even crop that is easier to harvest and maximises your yield potential. Completing seeding rate calculations prior to air cart calibration is essential to create an adequate plant population.
Too many plants per square metre, or over population may work in a good year, but will not be sustainable in a year with less than average rainfall. Overpopulation can be the sole cause of small grain in your harvest sample.

Too few plants per square metre in some crop types may result in un harvestable plants with stems too thick to enter the knife guard, thin crops are more difficult to harvest and may not be able to produce enough seed to reach the field yield potential.

Where do we start?

With bought seed, the bag will have a 1000 grain weigh on the tag. With collected seed, a calculation will be needed. Start by counting out batches of 100 seeds, then using an accurate scale, best using one that has 1/10 G accuracy. Use the average of several samples as your number. Do this for every variety you plan to plant and use samples from each field that the stored grain was harvested from. Remember, there will be differences in the seed size between varieties and samples collected from different paddocks.

What is my target plant density?

Work with your agronomist to determine your desired plant density. This will be determined by the background soil nutrients available, plus what you plan to add and how much rainfall your area average normally presents. Remember, this is your garden and you have to feed and water it!

Target plants/m² for annual rainfall zone			
Crop	**250 - 350 mm**	**350 - 450 mm**	**450 - 550 mm**
Wheat	150-180	160-200	160-220
Barley	130-160	160-180	160-180
Oaten Hay	250	250	250
Canola	40-70	50-80	50-80
Lentils	110-120	110-120	110-120
Faba Beans	15-30	20-35	20-35
Field Peas	35-70	40-70	60-80
Lupins	45-60	45-55	35-45
Vetch Grain	40-50	40-55	50-60

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Calculation

Sowing rate (kg/ha) = 1000 grain weight (g) x desired plants /m² ÷ germination percentage

Example 1:

Wheat 1 weighs 40g (1000 seeds), target plant population 150plants/m^2, approximate establishment = 80%

Sowing rate (kg/ha) = 40 x 150 ÷ 80 = 75kg/ha

Example 2:

Wheat 2 weighs 32 (1000 seeds), target plant population 150plants/m2, approximate establishment = 80%

Sowing rate (kg/ha) = 32 x 150 ÷ 80 = 60kg/ha

What if we used a blanket sowing rate of 80kg/ha?

Example 1:
Sowing rate (kg/ha) = 40 x 160 ÷ 80 = 80kg/ha

Example 2:
Sowing rate (kg/ha) = 32 x 200 ÷ 80 = 80kg/ha

Would you consider planting wheat at 200 plants per square metre on your average rainfall?

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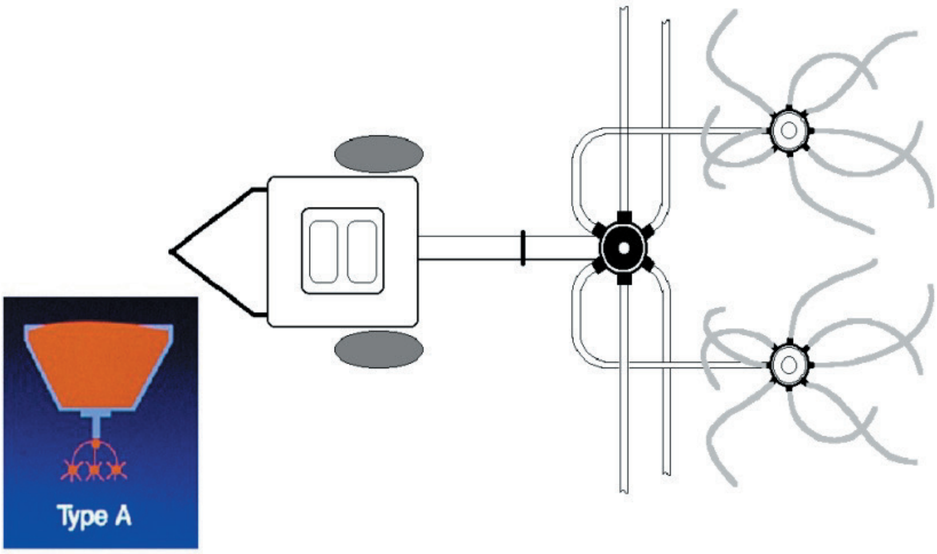
What does an airseeder do?

How does it work?

What are the basic parts?

As airseeders have evolved over the years, manufacturers have increased the precision of their machines. And as working widths have increased, getting seed and fertilizer from the meter on the tank to the openers is a much more complex task. Here's a look at the common distribution systems in use on today's air seeders.

Each manufacturer has it own design variation, but it is possible to describe all of them as falling into three basic categories, labelled types A, B and C. Each forces seed and fertilizer to travel a slightly different route from the grain tank to the seed openers.



Type A systems meter grain into a large-diameter primary tube that carries all the seed to a primary splitter. Here seed is separated randomly into a series of smaller-diameter secondary lines that carry it to a second splitter, for another random separation. From there, individual lines lead off to the seed openers that place it in the ground.

With this system, seed undergoes two random flow divisions. That means an increased possibility of variation in the number of seeds that make it to each opener. Some openers may get more seed than others.

Engineers call the amount of difference in the number of seeds reaching each opener the coefficient of variation. Independent testing organizations, consider a coefficient of variation of 10 per cent or less to be very good for establishing even plant stands.

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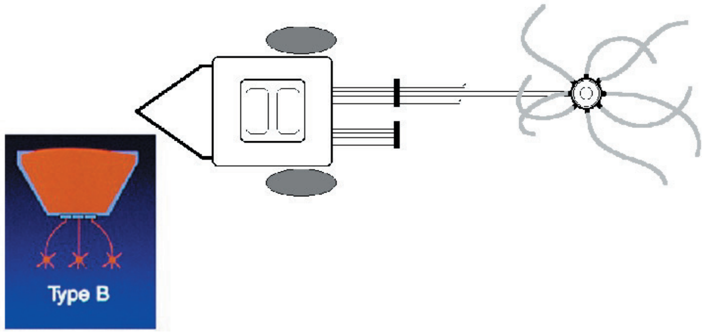
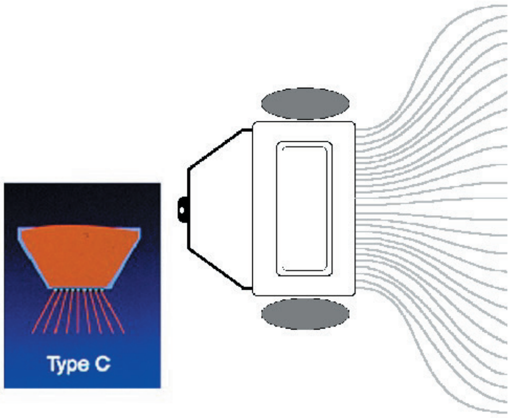
Type B systems have only one random split in the seed flow. The object of this system is to improve the coefficient of variation. Seed from the grain tank is metered into a series of primary hoses, each one leading to its own splitter on the seeder frame. That means there is only one random split on each line. From that splitter, seed flows directly to the openers.



Eliminating one random split is part of the reason that a lot of current manufacturers use this system as it is capable of a very accurate (+/-six per cent) variation between openers.



The final design, type C, does all the distribution right at the metering system under the grain tank. Seed is metered directly into individual lines, and they carry it all the way to the openers. There are no random splits in the system.

The upside of this system is the accuracy of the metering. The downfall of this system is compounded by bigger bar widths, the need for the distribution lines to be as near as practicable to the same length.

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System component pieces

Fan: Creates the air flow to carry the metered product from the air cart to the seed distribution head. May be single fan, may be dual fan or may be triple fan.

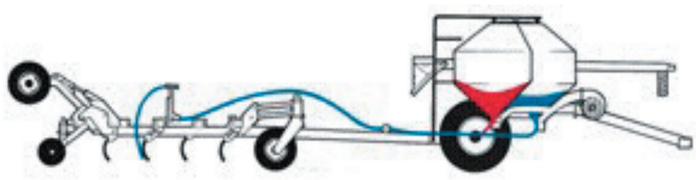
Damper system: If fitted, helps to manage differences in air pressure, air speed and loading in double and triple shoot systems.

Meter system: Provides a means to meter the granular products to be planted.

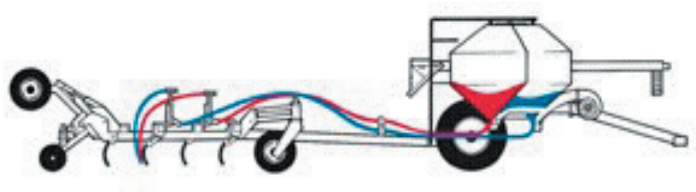
Meter drive: Provides the means to drive the air cart metering system, may be ground driven, may be electrically driven, may be hydraulically driven. May be fixed rate or variable rate.

Manifolds: Collects the metered product and delivers it to the air stream, may be single, double or triple shoot.

Distribution system: Hose and air kit, carries the metered product from the manifold to the seed boots.



Single Shoot



Double Shoot

Fan

Single?

- 1 fan feeding a single shoot system where all product is in a single air stream.
- 1 fan feeding a double shoot system where product is metered into separated air streams and use a baffle or damper system to control carrying velocity and volume.

Double?

- 2 fans feeding a single shoot system where all product is in a single air stream.
- 2 fan2 feeding a double shoot system where product is metered into separated air streams and may be completely separated or may use a baffle or damper system to control carrying velocity and volume.

Metering fundamentals

What are we trying to do? Calibrate our delivery of seed and fertiliser to give our field the required plant density for the best seed production for our given soil type or types. Calibrate our fertiliser delivery to supply adequate nutrient for our seed to achieve its maximum potential, given soil type and available moisture.

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Calibration Factors

We all know that we must calibrate our seeding tool, but what does it all mean?

Rate

- Kgs of seed per Ha = seeds per square meter = plant density
- Kgs of fertiliser per Ha = units of available nutrient = fuel for plant growth.

Generic calibration factors

- 10,000 square meters = 1 Ha
- 10,000 ÷ your bar width = the distance travelled to seed 1Ha

Mechanical Vs Variable rate

Mechanical drive carts will all be calibrated by distance travelled according to the wheel rolling circumference, this is what is telling the meter, how far the cart has travelled. All you need to know is the number of wheel revolutions for the distance required to seed 1Ha.

If this number is unknown, half load your air cart, mark the ground at the centre of the tyre footprint and the tyre at that point. Have another person drive slowly forward and count out 10 full revolutions of the tyre. Using a long tape measure or measuring wheel, measure the distance travelled and divide by 10 to get your average rolling circumference. You can also do this for fine tuning your speed and distance calibration.

Once you have this number, you can then determine how many revolutions your wheel does to seed 1Ha. Normally, when calibrating, we will manually meter 1/10Ha of product and multiply out to see our actual metered product rate. Most mechanical air carts will have a manual crank handle for calibration, you need to know how many times to turn this handle to meter 1/10Ha of product. This can be done at the same time as the wheel circumference test, turn the wheel 1 full turn and count the handle turns.

Some older air carts may not have a handle, you may need to jack up a wheel and turn it to complete the calibration.

Modern ISO compatible manual air carts will all have advanced electronics to perform the calibration, where the electronic system automatically counts and calculates for the theoretical travel distance and application rate based on the preset parameters loaded into the computer system.
Remember: for this to be accurate, all calibration factors must be correct.

Variable rate carts will all have advanced electronics to perform the calibration, where the electronic system automatically counts and calculates for the theoretical travel distance and application rate based on the preset parameters loaded into the computer system and then following a user generated prescription map.

Remember: for this to be accurate, all calibration factors must be correct.

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Air System

Carrying velocity, is the term used to understand product flow and the air systems ability to transfer the material from the air cart to the seeding boot. This velocity is critical in that there must be sufficient volume and velocity to carry all of the metered product without blockages in the system. Critical aspects of this system relate to the total volume of product being carried, the bulk density of the product, the design of the distribution system and the maximum hose length required.

How do I adjust my damper system

On double or multiple shoot systems that are required to carry products of vastly different bulk densities or volumes, there must be a way to prevent cross over or back feeding of the air volume. Most manufacturers will use a simple damper, this effectively divides a single air supply into the required number of air streams, allowing the operator to direct the air volume to the appropriate shoot to carry the metered product to the tertiary heads.

How do I determine my fan speed

Your fan speed is easiest to set by removing a cap from each head at the furthest end of the seeding tool. Run the system to deliver product at the rate that would be expected at the highest seeding rate. Measure the height the product is blown freely clear of the head. This should be between 800mm and 1200mm.

Maximum carrying capacity

Each manufacturer will have detail of the maximum carrying capacity for their air system, but remember the manufacturer has an outline for what they desire as a suitable air system for their machine, but mostly, it is your local dealer that installs this and there are a lot of variations between air systems delivered to end users due to the different interpretations of the instructions from the many different dealers. There are so many variables to take into consideration., bar width, maximum line length, number of outlets, tow between or tow behind. etc.

Air Cart Air Leakage Testing

Some air carts are sealed, and some are not. All sealed air carts must be periodically tested for air tightness.
Leaks in an air tight system can cause metering anomalies and need to be eliminated for consistent accuracy of operation.

Testing can be done using a soapy water spray, a powder duster or smoke bomb to locate any leakage spots.
Air tight systems also have an air pressure transfer system that must be tested and maintained. Understand your particular system and periodically test for leaks and also blockages in the air transfer system.

Air Kit Fundamentals

Every manufacturer will have their own set of guidelines for assembly of air kits for their air carts and most will have layout plans for use with the seeding tools or bars they manufacture.
For ease of understanding, I have condensed their guidelines to a set of generic concepts for a user to follow that simplify the process and give some guidance that is relatively easy to follow.
For machines using section control systems, there are a few guidelines that are not negotiable for acceptable distribution and function.

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Air Kit Assembly Instructions

All Primary air kit hoses must cross over above a drawbar pivot, failure to do so will result in both premature line disconnection and line kinking and permanent damage.

Primary lines must be as near as practicable to the same length. Within 10% maximum.

Pairs of primary distribution heads must be located as close as practical to the centre of the frame in both directions.

Pairs of secondary heads must be located as close together as practical.

Individual secondary heads must be located as close as practicable to the centre of the tynes they will be distributing product to.

By convention, all fertiliser heads are mounted forward and seed heads are rearward.

By convention, all seed heads are mounted higher than fertiliser heads.

All secondary lines must be as near as practicable to the same length. Within 10% max.

Tertiary lines between front and rear rows of tynes must be as near as practical to the same length.

All lines that cross a wing fold must do so at an angle so they will slide if required when folding.

Test fold and ensure there is no clash of heads and risers as the machine is folded.

Section control air kits must run the head numbering sequence from the left side of the bar to the right as directed from the operators seat.

Bar mounted section control primary heads must not distribute to consecutive secondary heads in sequence or system inaccuracy and imbalance will occur when consecutive sections are switched off. Air Cart mounted systems will come pre numbered to prevent assembly errors.

All machines fitted with parallelograms must have their tertiary hosing installed with the parallelograms fully down to prevent unwanted hose disconnections, unless directed differently by the manufacturer.

Follow manufacturer specific requirements that may be included in their air kit installation and assembly guidelines.

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Distribution Testing

Distribution testing is used to test the air kit efficiency and accuracy of distribution across the seeding tool.

Distribution testing can be used to locate meter anomalies, or errors from the air cart and errors in distribution across the air kit and directs the analyst to the means for correction.

Ensure that your distribution test sheet accurately reflects the air system hose layout, this ensures accuracy and allows the best interpretation of the data to detect any anomalies.

For single shoot systems, test both distribution systems separately. Seed system with wheat or barley and fertiliser with your least powdery fertiliser or use wheat or barley.

For double shoot systems, test both systems at the same time for best results. Use wheat or barley for the seed system. Use your least powdery fertiliser or wheat or barley for testing the fertiliser system.

Expect a greater variance when testing with granular fertilisers that have a portion of powder.

With each test, you need to collect between .5 and 2Kg per bucket. The more you collect, the more accurate the test, but you also have to handle more product.

Test with the system metering a calibrated quantity equivalent to your normal seeding rate. If you seed at 70Kg/Ha seed and 70 Kg/Ha fertiliser at 8Kmh. Test your system with a simulated speed of 8Kmh and both meters calibrated to deliver 70Kg/Ha.

Perform the test on flat and level ground.

Do not test systems using lupins. They roll in a way that distorts the test results. (I tested the same system with lupins 10 times and every time had a different result and every test failed) The same system tested 3% variant 3 times consecutively straight after when tested using wheat.

Do not test systems using canola. The low seed delivery rates make weighing the test collections very tricky, takes a long time and if you spill any of the seed, it is expensive.

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Seeding Bar Notes 2024

Seeding Tools (bars)

Slab frame vs flexible or articulating frame

- Do I need articulation for my frame to follow my ground or will a slab frame work for me.
- Level lift
- Fixed height with tyne lift
- How many rows

Wheels

- Fixed, casters, walking beams
- Within the frame or outside the frame
- Steerable
- CTF
- Flotation

Levelling

- How do I do it
- Why is levelling important
- What are to possible implications if my machine is not levelled

Uniformity of seed bed

- Individual tyne digging depth
- Row spacing uniformity
- Full tillage, minimum tillage, No Till

Trash Flow

- Under frame clearance.
- Tyre to tyne clearance.
- Row spacing
- Tyne layout, how to improve trash flow.

Trash Handling

Tricks to help improve trash handling.

Coulters?

- Do I need them
- Fixed or pivoting
- Solid or sprung
- Benefits, designs or types

Tyne Vs Disc

- Straight shank
- C Shank
- Parallelogram
- Single disc
- Double disc
- Tripple Disc

Press Wheel design and selection

- Diameter
- Is bigger better?
- Shape? Round? Square? Vee?
- For water harvesting or seed to soil contact

Depth control

- Whole of machine
- Individual row unit
- Individual Tyne
- Minimum and maximum sowing depth

Maintenance

- What wears out
- How fast does it wear
- How expensive is it to maintain

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