

YOUR OPPORTUNITY TO IMPROVE PASTURE MANAGEMENT DECISIONS

Meat & Livestock Australia (MLA), Spatial Information Systems Research Ltd (FrontierSI) and the University of New England are offering interested partners a free licence to access algorithms for calibrating normalised difference vegetation index (NVDI) measurements and pasture biomass.

The licence will make these algorithms available to support pasture biomass assessment from various proximal and remote diagnostic approaches.

The problem

Real-time, accurate estimates of pasture quality and availability are essential for livestock management.

Most producers tend to make a visual estimate when assessing pasture availability, which are typically inaccurate by 20%.

More accurate, objective and repeatable measurement of pasture availability is required to improve:

- matching available pasture to meet livestock demand
- livestock productivity
- pasture utilisation
- profitability
- whole-farm management and sustainability.

A key issue for many producers is reliable access to timely, precise information on pasture availability.

The solution

An app and algorithms have been developed, which when coupled with an Active Optical Sensor and height measurements, enable effective estimation of green dry matter.

The algorithms, based on cutting to ground level (no stubble) and NVDI, have been proven to convert field-collected data into estimated green pasture biomass with up to 90% confidence.

Many producers from the field trials are still using the beta-tested app and could be transitioned onto a new platform.

The biomass algorithms might be used in technologies for:

- estimating pasture biomass
- mapping pasture yield
- setting pasture and livestock management targets
- supporting development of drone or satellite approaches to biomass assessment.

The opportunity

MLA, FrontierSI and the University of New England are offering a royalty free non-exclusive licence on the biomass calibrations, algorithms and intellectual property, on the conditions of appropriate acknowledgement and reporting.

An app which integrates these algorithms with a handheld biomass sensor is also available to interested companies.



More information

For more information or to register your interest in the new product, please contact:

Phil Delaney

Chief Innovation and Delivery Officer – FrontierSI
T: 0405 034 442
E: pdelaney@frontiersi.com.au

Amanda McAlpine

MLA Program Manager – Commercialisation & IP
T: 0406 428 395
E: amcalpine@mla.com.au

Guidelines for using the Biomass App and Trimble Greenseeker Handheld NDVI Sensor to estimate Greed Dry Matter in pastures

Author Dr Mark Trotter, Senior Lecturer Precision Agriculture, University of New England Armidale
NSW 2351

Correspondence: all correspondence including suggested improvements should be directed to email
biomass@une.edu.au

The following are a set of guidelines developed to assist users in setting up and using the Biomass mobile device application (MDA) in conjunction with the Trimble Greenseeker Handheld NDVI sensor to provide estimate of Green Dry Matter (Kg/Ha) in pastures. This forms part of a current research project supported by Meat and Livestock Australia and the CRC for Spatial Information and as such the system and the Biomass MDA in particular are constantly evolving. You may find the detail in these guidelines out of date by the time you come to use the system however there should be enough information to point you in the right direction.

Follow this step by step guide to get set up and going with eh Biomass MDA...

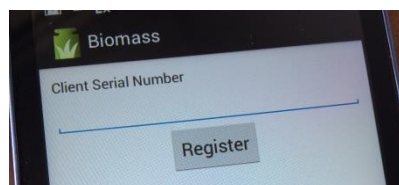
1. Download and install the Biomass MDA from the Google Play Store (Android only). Please note that an iPhone version of the Biomass MDA is yet to be developed (sorry I love my iPhone too). The Biomass MDA can be found at this URL:
<https://play.google.com/store/apps/details?id=org.hitlabnz.biomass>



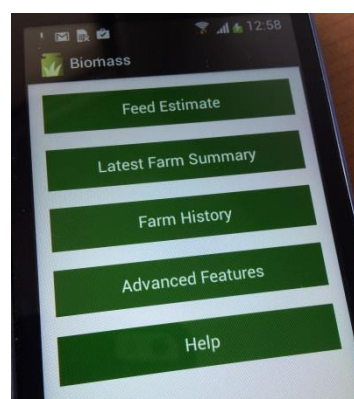
1. You will need a client serial number to start using the Biomass MDA. This client serial

number is available to approved users via email

(biomass@une.edu.au).



3. Once you have your Biomass MDA installed

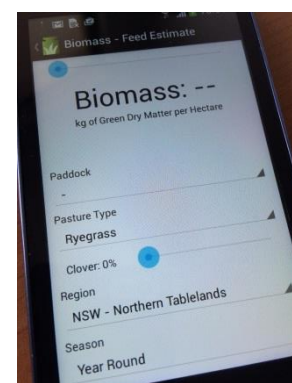


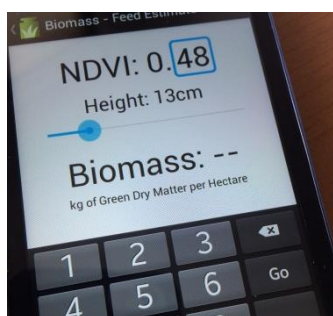
and client serial number entered you will have access to the full version of the app.

Please note that some

components of the MDA are still in development and so may not be operational (or might work but generate erroneous data).

4. You can start off by simply using the MDA for a one of biomass assessment (rather than setting up paddocks). Simply click on the "Feed Estimate" button. You will get the data input screen. You should input the pasture type, region and season (note clover % is not operating yet) to select the correct calibration to be applied.





5. Once you have selected the correct pasture type, region and season (or a custom calibration from the list) you can

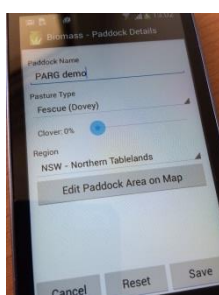
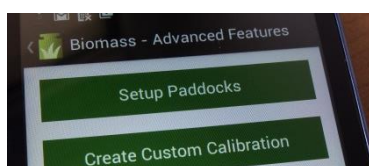
then enter the NDVI and height estimate (but see the separate section on using the Trimble Green Seeker and estimating height). Then hit go.

6. You should now have an estimate of the Green dry matter for the area you have scanned. You need to be aware that this is a measurement of the Green Dry Matter only not the senescent or dead component of the pasture sward (we're still working on that!).

Setting up paddocks

Once you have tried the sensor as a stand alone calibration you might like to set up some paddocks. Doing this allows you to easily record data for each paddock, as the pasture type is stored on the app and populated when you choose the paddock and it also records the data for each scan that you undertake for later download and analysis.

1. Select the advanced features button and then the "Set up paddocks" button.

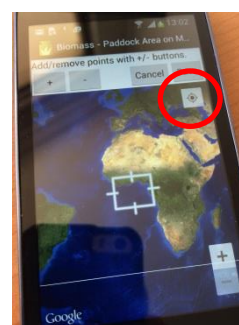


2. Enter the name of the paddock along with the pasture type and region (or if you have a custom calibration select it).

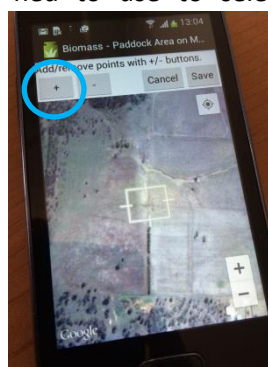
3. Select the "Edit paddock area on map"

button to produce a map interface. If this is the first paddock you are setting up the

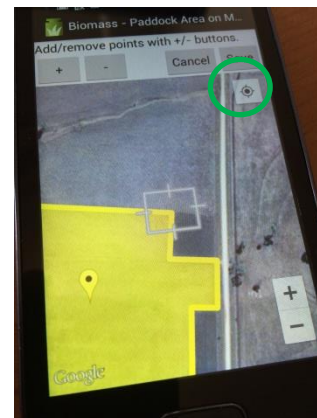
Mobile phone may not locate you nearby. If this is the case look for the little button that will geolocate you and centre the map on your current location (see the red circle on adjacent image)



4. The mapping interface has a set of cross hairs which you need to use to select the corners of your paddock. Use the "+" key on the top left of screen to add a new corner (see blue circle on adjacent image).



5. Complete your paddock and select the save button in the top right hand corner of the screen (highlighted in green circle). Save the new paddock information.



6. Check to ensure that the new paddock is listed in the "latest farm summary" screen which is a button located on the main menu screen. If not go back in an edit the details as required.

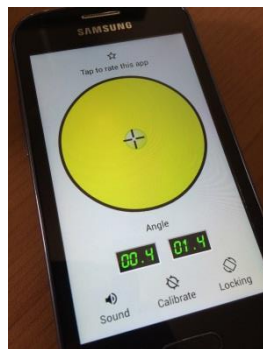
7. You can now go to the "Feed Estimate" button and select the paddock name and all required information (pasture type, region and season) should automatically populate.

Using the Trimble Greenseeker to collect NDVI...



One of the critical steps is the collection of NDVI data using the Trimble Greenseeker. There is also a standard protocol for collecting the height estimate from pasture where it is required.

1. When using the Greenseeker it is important to hold the sensor relatively level, a plastic bubble level is useful to judge how level you are holding the sensor. You can also use your mobile phone by downloading a bubble level app such as this one free from Google Play: <https://play.google.com/store/apps/details?id=net.androgames.level>. Keeping the sensor level means that it has the correct viewing angle of the pasture leaf canopy. You will notice that this changes if you view the same area of pasture from a different angle.

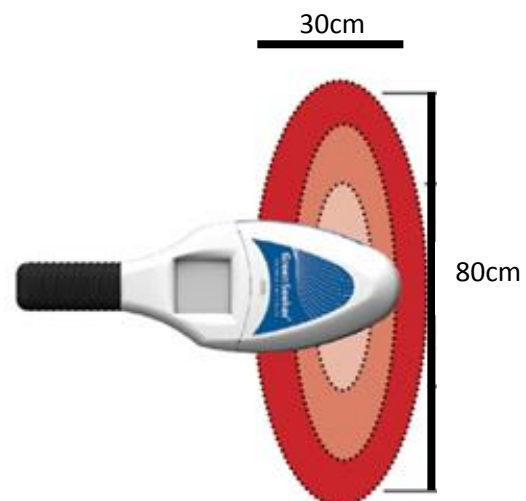


2. Another important feature of the Trimble Greenseeker is the height at which you operate it. While the actual sensor can operate independently of height above sward it does have its limitations. Too close and you will receive the error code "E_C" on the screen, too high and you will receive an error code of "E_F". All calibration of the sensor and MDA has been undertaken at a height of 1 metre. The closer you can use the sensor to this height the better although you will find

you can usually get away with 1 metre + or – 30cm.

3. While the height doesn't affect the actual sensor reading itself it does influence what the sensor "sees" on the ground. We call this the sensor footprint and the best way to see this is to use the device in a dark room. The closer you are to the target (pasture) the smaller the footprint (the red illuminated area) will be and the further away the larger the footprint will be.

At 1 metre the sensor footprint of the Greenseeker can be approximated by an ellipse measuring 80cm on the long access and 30 cm on the short access



The critical point here is to ensure that the footprint of the sensor is located over the pasture and does not have your boot or part of a vehicle in it!

4. To operate the Greenseeker you first need to make sure it is adequately charged. Once out in the field you can use the Greenseeker in 2 ways, either single point mode or in survey mode.

5. Single point mode, this can be useful when you are trying to get accurate measurements from a single key location in a field. This is particularly important in some situations

where height is an important contributor to the calibration. Simply hold the sensor above the sample area and pull the trigger once. The NDVI will appear on the output screen. Then measure the height of the pasture and input both into the MDA

6. Survey mode is useful to get a better representation of the field as a whole. In this technique you will hold the trigger of the sensor down while moving along a transect. The transect is simply a line between two or more points. You need to make sure that the route you take contains a good representation of the pasture you are measuring (If you drive through a giant patch of thistles then you will likely produce a dodgy result!)



When you have finished your survey you simply take your finger off the trigger to reveal the average NDVI for the area scanned.

When taking a survey mode scan you need to be aware that the sensor will log for a maximum of 60 seconds before returning the average.

The challenge with survey mode is often the estimation of the average height (when using a calibration which requires height input) over the transect. The best option is to concentrate on estimating the average height while the Greenseeker is recording the average NDVI. Where pasture height is highly variable you may have to take several single point mode scans rather than rely on a transect survey.

Estimating pasture height...

Current height estimates are related to the plate meter being used in the calibration

process. This plate compresses the sward and so is not directly a measure of pasture height but contains a component of density. We are currently in the process of calibrating the plate heights to a more easily assessed visual method.

To obtain an estimate of height a simple rule can be used or the Greenseeker itself can be marked with height gradations to enable a one stop tool.



A final word...

This sensing package is still in development and evaluation. If you have any comments or suggestions please shoot them through to biomass@une.edu.au