# "Range Condition Evaluation in Empedrado, Corrientes - Argentina"

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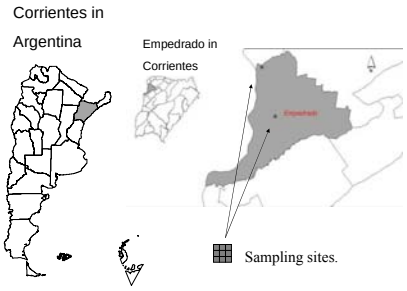
## BACKGROUND and OBJECTIVE

- The total area of rangelands constitutes 78% of the Empedrado Department surface (Corrientes Province – Argentina).
- Rangeland evaluation is considered essential part of a good management and sustainable use, but direct measurements are laborious. When a larger coverage area is addressed, remote sensing plays a central role in resources evaluation, not only at different temporal resolutions but also at different scales.
- The aim of this research is to evaluate two types of rangelands in Empedrado – Corrientes by following to different approaches: field and remotely based procedures.

Highlands. Lowlands.

## GEOGRAPHIC LOCATION




## MATERIALS & METHODS

Field evaluations:

The experimental unit was a nine block design (28.5 m x 28.5 m) in five random samples within, the attributes recorded were:
- Botanical Composition (BC) (by the dry weight rank method)
- Visual estimation of: % of Standing Dead Material (SDM); % of Mulch (M) and % of Bare Soil (BS).
- Aerial biomass was collected by clipping on 0.25 m² quadrates.

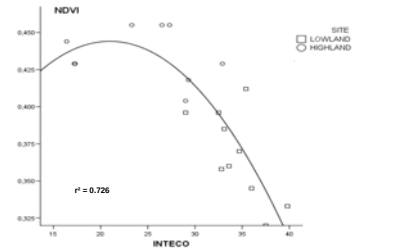
Laboratory evaluations:

- The Normalised Difference Vegetation Index (NDVI) was calculated from a Landsat 5 TM image, path 226, row 079, acquired on 07/27/2006.
- The Trend and Cover Index (INTECO) was calculated. INTECO evaluates range condition by multiplying all the attributes recorded in the field, including species quality (classified as: fine species = 2; tender = 1; ordinary = 0.5; hard = 0.25; weeds = 0.1). The INTECO value varies between 10 and 200.
- Dry Matter Yield (DMY) was calculated from difference between wet and oven dry plant biomass.

## CONCLUSIONS

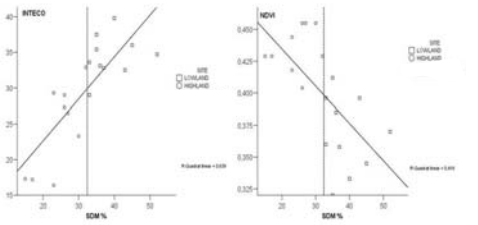
- NDVI and INTECO indexes showed to be inversely related: this relationship should be further investigated.
- Botanical composition evaluation is an essential tool to support the calculated NDVI by the Landsat 5 TM images.
- For an accurate estimation of range condition, a combination of Landsat images and ground data should be used.

## RESULTS

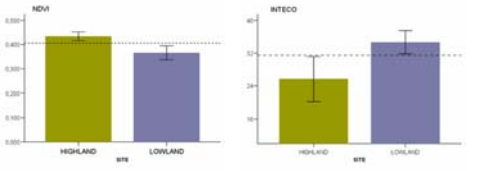



Under these experimental conditions NDVI and INTECO were inversely related. The reason is explained by the high proportion of non edible weeds (*Table 1 - 2* and *Figure 2*) which remain green on the highlands, thus increasing NDVI values. On the contrary, on the lowland site, weeds were hardly found. The more SDM (*Figure 1*) corresponding to grasses, makes the INTECO higher (better rangeland condition) whilst NDVI remains low.

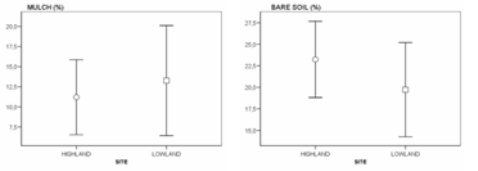
## RESULTS




SDM is positively related to INTECO and negatively to NDVI.




NDVI and INTECO were significantly different ($p<0.05$) in highland and lowland sites.




Both estimated variables, M and BS were not significantly different ($p<0.05$) in highland and lowland sites. As a result, no spectral influence can be attributed to them.

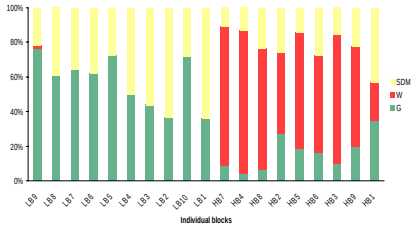



*Figure 2*. Dry Matter composition. LB1 to LB10 stays for lowland block 1 to Lowland block 10 and HB1 to HBn stays for highland block 1 to highland block 9 respectively.



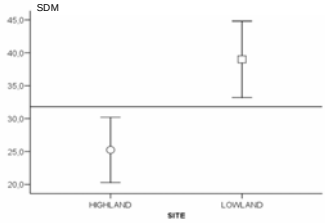



*Figure 1*. Dry matter of dead material biomass component (%). The contribution of dead material as biomass component was significantly different in both sites.

## RESULTS

***Table 1.*** **Calculated aerial biomass (07-04-2006). DMY of five principal species and total DMY on the lowland site.**

| Species | (kg ha$^{-1}$) | % |
|---|---|---|
| *Paspalum intermedium* Munro ex Morong et Britton | 1,037.5 | 45.4 |
| *Sorghastrum agrostoides* (Speg.) Hitchc. | 611.4 | 26.7 |
| *Andropogon lateralis* Nees | 418.8 | 18.3 |
| *Axonopus affinis* Chase | 56.2 | 2.5 |
| *Paspalum urvillei* Steud. | 38.8 | 1.7 |
| Total DMY | 2,271.6 | 100.0* |

***Table 2.*** **Calculated aerial biomass (06-27-2006). DMY of five principal species and total DMY on the highland site.**

| Species | (kg ha$^{-1}$) | % |
|---|---|---|
| ✹ *Vernonia chamaedrys* Lees. | 1,775.8 | 50.7 |
| *Sorghastrum agrostoides* (Speg.) Hitchc. | 479.2 | 13.7 |
| ✹ *Eryngium horridum* Malme | 396.5 | 11.3 |
| *Sorghastrum nutans* (L.) Nash | 381.4 | 10.9 |
| *Paspalum notatum* Flügge | 130.1 | 3.7 |
| Total DMY | 3,496.8 | 100.0* |

✹ Non edible weeds represent more than 50% of DMY in the highland site, being almost absent in the lowland site. * Significantly different ($p<0.05$)

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