

## Scheduling Cattle Grazing Considering the Offer and the Nutritive Value of the Invader *Elaeagnus angustifolia*

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### Introduction

Now that the invasive *Elaeagnus angustifolia* (silverberry, Russian olive), naturalized in the Mid Valley, Río Negro, Argentina, has been recognized as a forage resource, its presence and phenology must be considered in the yearly schedule of rangeland management.

Previous studies showed leaf heteromorphology (Klich, 2000). Field observations showed that cattle prefer the leaves of *E. angustifolia* that are included on the reproductive branches which develop as an inflorescence called a proliferating thyrse.

The aims of this field/laboratory trial were to find out the incidence of *E. angustifolia* in the breeding cow's diet as determined by microhistological analysis of cow faeces; to map the distribution patterns and quantify the abundance of *E. angustifolia* in different parcels; to estimate the volume of forage produced by this species and to determine the nutritive value of the edible parts of the plants. The results are used to schedule grazing periods in a valley farm divided into plots with different abundances of *E. angustifolia* and a known floristic composition.

### Material and Methods

#### Study site

A 560 hectare farm at the northern margin of Río Negro province, Argentina (39° 30' S, 65° 30' W) where *E. angustifolia* has become naturalized. Temperate semiarid, annual precipitation is 303 mm.

The farm is divided into 12 parcels of different sizes, distributed from the river coast to the plateau/valley ecotone (Figure 1). The area, the percentage occupied by *E.angustifolia* and the distribution of the populations were defined for each plot using maps and satellite images (Table 1, Figure 1, detail).

#### Biomass

To estimate the amount of forage that cows may eat from the *E. angustifolia* trees, samples were collected, dried and weighed in the middle of the growth cycle, i.e. in January, when the fruits have formed on the thyrses but they are not mature and the seeds are soft and digestible by cows (from

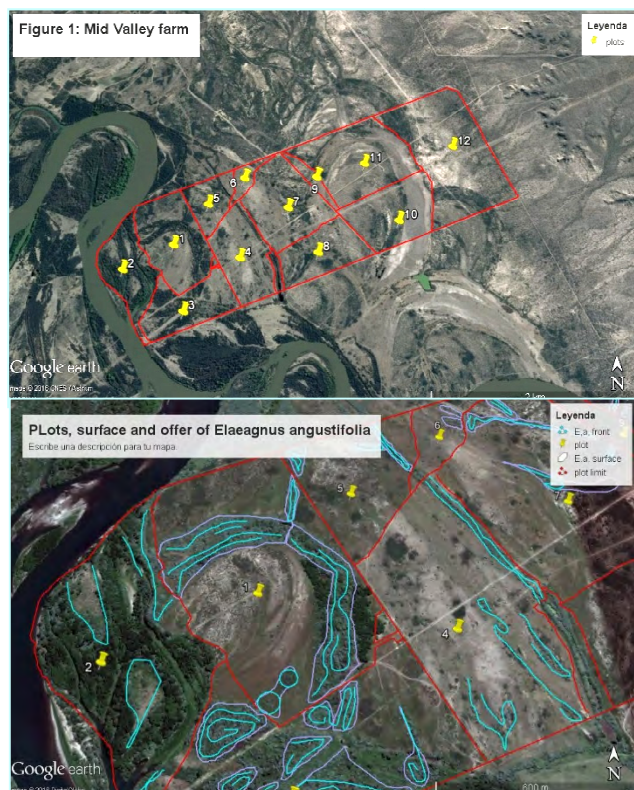


Figure 1.

February onwards the entire seeds are eliminated in the faeces).

Cows may eat the thyrses up to 2.50 m in height. Average weight of thyrses 11.03 gr DM, 20 per branch, there are 92 reproductive branches in 1 linear meter per 2.5 m height, and the dry matter production was estimated as 20.29 kg/m /2.5m). Where the population of *E. angustifolia* follows the course of old river channels we considered the dry matter produced on both sides and ignored the production of reproductive branches on the interior of the channels because they were small and of difficult access for the bovines (Figure 1, detail).

**Diet microhistological studies and Feed Analysis.** Detailed method explanation in Klich, 2014.

**Statistical analysis.** Data were analyzed with ANOVA, and Tukey Test (p-level 0.05).

**Results and Discussion**

It was planned to use the paddocks with silverberry for grazing during the spring/summer and the data confirmed that cattle find the thyrses leaves palatable and eat them first when moved into a plot (table 1). Table 2 shows that this plant offers a nutritive and digestible forage resource.

**Table 1. Plot surface (P ha), Surface occupied by *E. angustifolia* (E.a. ha), % of the plot area (% E.A. inv), Edible E.a. Biomass offer per plot (t/plot) and E.a. biomass available per bovine consumption per ha of invaded area. (t/ha inv.) or per plot (t/plot) , month of grazing by plot (Month. Gz), Consumption at the beginning of the grazing period as determined by microhistology, % of the total diet. (% E.a. diet).** Different letters in the same column mean significant differences at p<0.05 by Tukey Test.

Plot N°	P ha	E.a. ha	% E.a. inv	E.a. t/plot	t /ha inv.	t/ha plot	Month Gz	% E.a. diet / stage
1	57.0	16.07	28.14	135	8.40 b	2,37 f	November	37.26 (flowering)
2	42.0	5.78	13.60	59	10.14 d	1,38 e	December	45.69 (small fruit)
3	39.0	11.97	30.72	133	11.10 e	3,44 h	January	70.59 (smooth seeds)
4	44.7	6.40	14.31	13	20.03 h	2,91 g	February	29.54 (hard seeds)
5	23.2	2.10	9.05	24	11.23 f	1,02 d	End October	
6	8.0	0.63	7.80	5	7.90 a	0,62 b	gathering paddock	
7	60.1	5.62	9.35	54	9.70 c	0,91 c	March	29.00 (hard seeds)
8	40.0	----	----	----	----		April, May	
9	8.0	----	----	----	----		gathering paddock	
10	54.0	----	----	----	----		August	
11	79.0	0.87	0.87	10	11.50 g	0,13 a	October	1.80
12	110.0	----	----	----	----		June, July	----

**Table 2: Feed (crude protein (CP), ashes (ash), neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL) in vitro dry matter digestibility (IVDMD) as %) and nutritional analysis (ppm, except chloro as mg/100g) of complete thyrse and separated leaves and fruits in October 2013, January and March 2014.**

Month and material	CP	ash	NDF	ADF	ADL	IVDMD	K	Ca	Mg	Na	P	S	Cl
Oct 2013	33,74	7,00	49,43	20,74	4,97	63,84	10896	4387	1615	408	5022	3662	229
Jan14 complete thyrse	15,35	5,11	35,37	22,23	8,53	66,30	2944	7817	2035	951	1027	1938	226
Only leaves	22,02	7,41	39,38	22,09	7,27	62,11	3743	9904	2446	1201	1149	2053	300
Only fruits (inmature)	8,60	3,44	14,74	9,09	2,82	88,25	3138	676	436	369	664	590	67
Mar14 complete thyrse	15,27	8,06	37,36	24,67	8,80	62,17	3851	9449	1952	1371	1332	2146	304
Only leaves	20,16	6,94	37,99	21,41	7,08	57,05	8702	9040	1859	1517	1418	2811	341
fruits (without seeds )	7,02	3,67	19,83	12,05	3,81	84,85	6028	1369	433	507	582	470	69

### Conclusions and Implications

The grazing schedule of the farms in the Mid Valle of Río Negro may serve to improve the quality of feed considering the forage offer of the naturalized invader *E. angustifolia*. We are completing the study with an evaluation of the herbaceous strata biomass and quality, and also calculating brut protein/metabolized energy values to compare forage resources.

### References

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