REFORMA - *Resilient water- and energy-efficient forage and feed crops for Mediterranean agricultural systems*

Cereal-legume Mixtures For Annual Forage Crop Under Mediterranean Conditions

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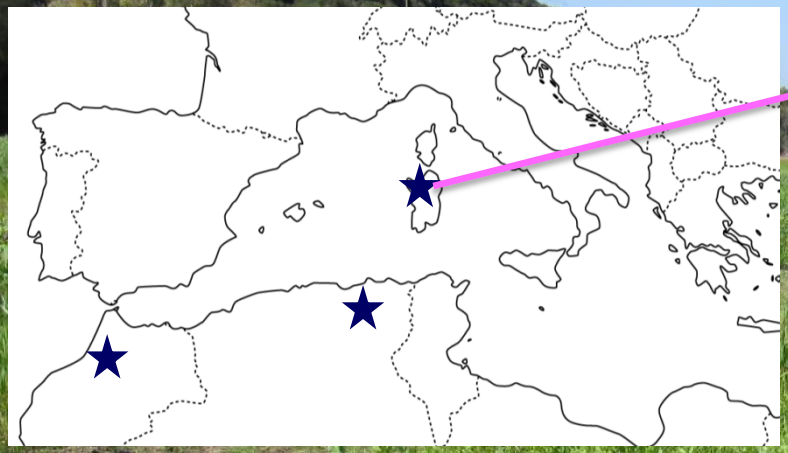
Introduction

The resilience towards climate change and the economic and environmental sustainability of Mediterranean farming systems might be enhanced by the introduction of multispecies mixtures

The use of cereal-legume mixtures is traditionally considered a good agronomical practice if compared to monocultures. Nonetheless, it requires some innovation to increase yield efficiency

This study aims to optimizing the composition of annual legume-based mixtures in climatically-different drought-prone Mediterranean environments as a function of the associated cereal (oat or triticale) and the legume species (forage pea, common vetch and Narbon vetch)

Materials & methods



EXPERIMENTAL SITE

North Sardinia: 41°N 8°E; 24 m a.s.l.
Mean annual rainfall 550 mm
sandy-loam alluvial calcareous soil (pH 7.8)

EXPERIMENTAL PROTOCOL

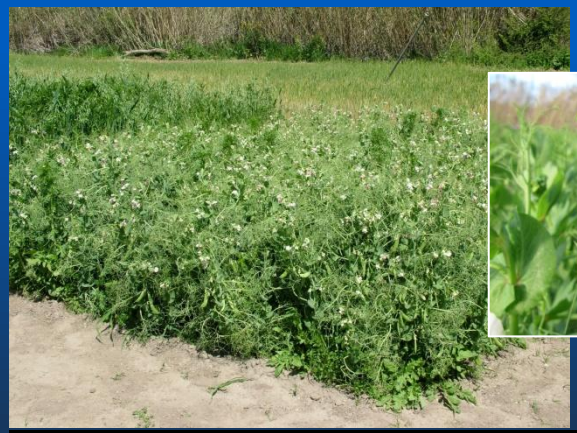
- ✓ **Fertilization: 30 kg N and 45 kg P_2O_5 ha^{-1}**
- ✓ **Plot dimension: 4 x 3 m**
- ✓ **CRB design with 4 replications**
- ✓ **Sampling area: 1 square meter**
- ✓ **Seeding dates: 7/11/2013 and 21/11/2014**
- ✓ **Harvests: for hay production in May 2014 and 2015**

Measured variables

DMYs – Legume rate – rate of weeds

Materials & methods

PLANT MATERIAL



Semi-leafless semi-tall forage pea Kaspa (P1)

Semi-leafless tall forage pea line 2/37b (P2)

Narbon vetch Bozdag (N)

Common vetch Barril (V)

Oat Genziana (O)

Treatments:
6 pure stands
8 binary mixtures
2 four-components mix

Triticale Amarillo (T)

Materials & methods

Visual assessment

- 40 and 60 farmers were involved respectively in 2014 and 2015

Traits

- ❑ DMY
- ❑ Forage quality
- ❑ Interest as a crop
- ❑ Interest as feed
- ❑ Crop global value

Score ranking

1= very poor/low
2= poor/low
3= sufficient
4= high/good
5= very high/very good

Results

Forage production

2014

Crop	DMY sown species (t ha^{-1})	DMY index
P2	9.64	1.61
P1	7.67	1.27
P2-T	6.68	1.22
P2-O	6.26	1.13
V-O	6.22	1.11
P1-P2-O-T	6.38	1.08
V-T	5.69	1.03
V	5.61	1.00
P1-O	5.67	0.96
N-V-O-T	5.18	0.87
P1-T	4.79	0.81
O	4.73	0.80
N-O	4.07	0.72
T	3.04	0.57
N-T	3.06	0.53
N	1.54	0.29
Mean	5.39	

LSD 2014 = 2.2

2015

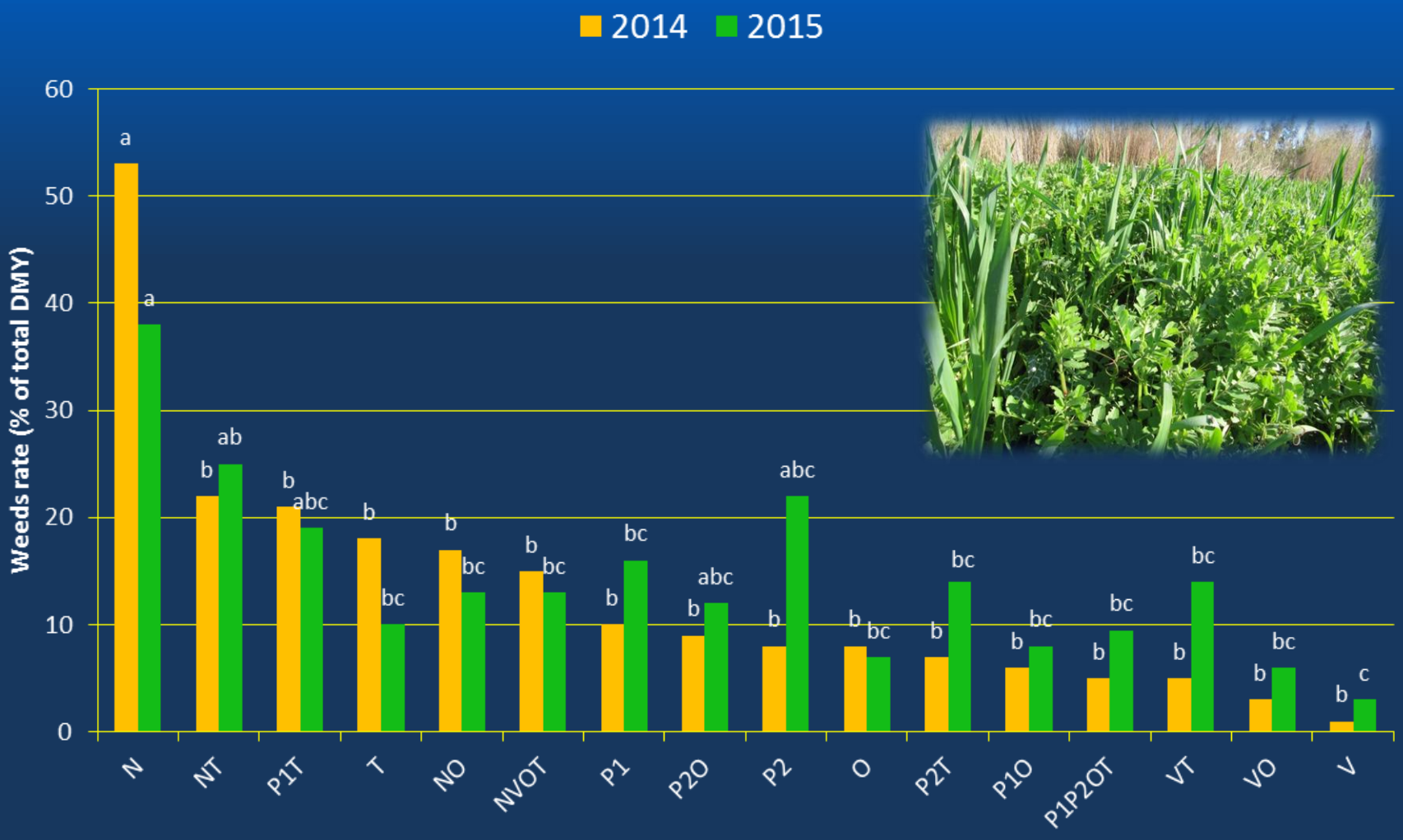
Crop	DMY sown species (t ha^{-1})	DMY index
O	8,16	1,36
P1	7,95	1,33
V	7,36	1,23
V-O	6,98	1,17
T	6,89	1,15
P1-O	6,41	1,07
P1-T	6,40	1,07
P2-O	5,97	0,99
V-T	5,83	0,97
P2-T	5,73	0,96
P1-P2-O-T	5,58	0,93
N-V-O-T	5,57	0,93
P2	5,54	0,92
N-O	4,82	0,80
N-T	4,15	0,69
N	2,46	0,41
Mean	5,99	

LSD 2015 = 2.7

(P1) pea Kaspa
(P2) pea line 2/37b
(N) Narbon vetch Bozdag
(V) common vetch Barril
(O) oat Genziana
(T) triticale Amarillo

Results

Weed rate in pure stands and mixtures



(P1) forage pea Kaspa; (P2) forage pea line 2/37b; (N) Narbon vetch Bozdag
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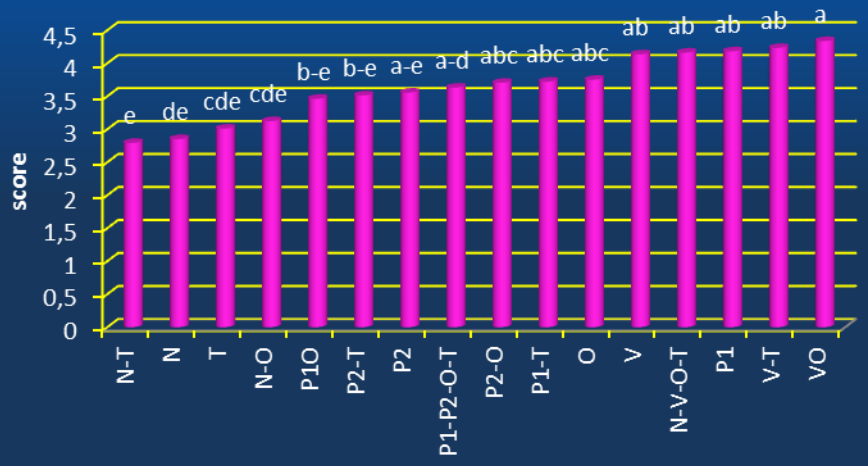
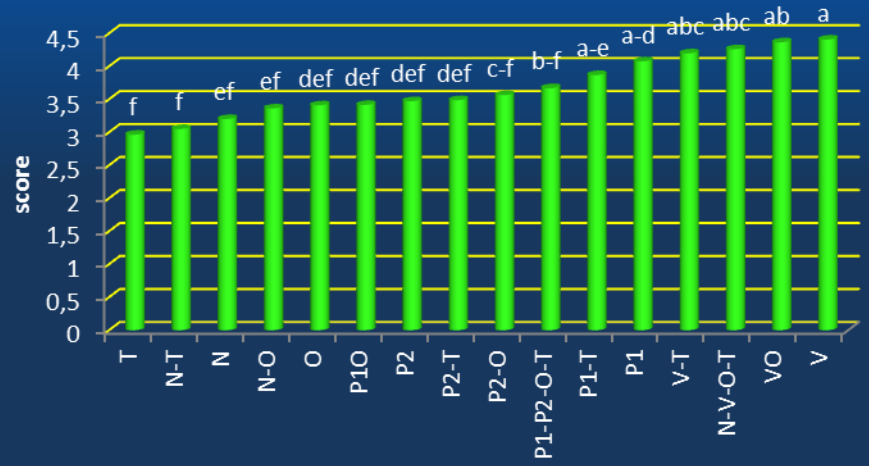
Results

Farmers-partecipatory assessment

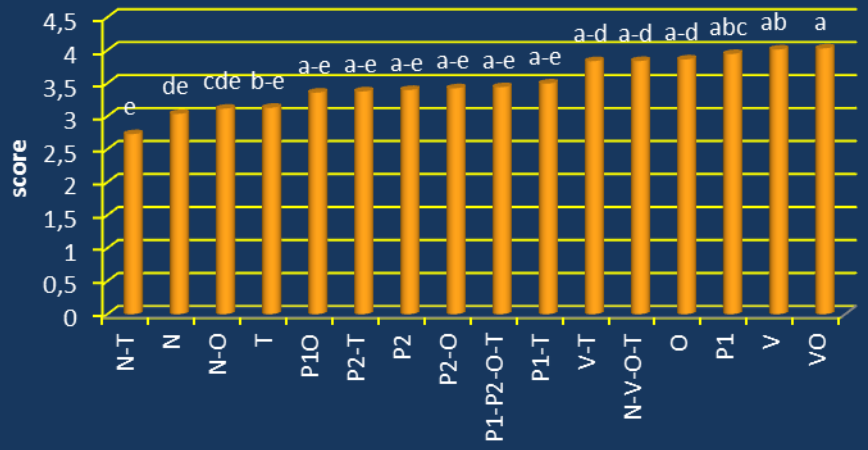
DMY



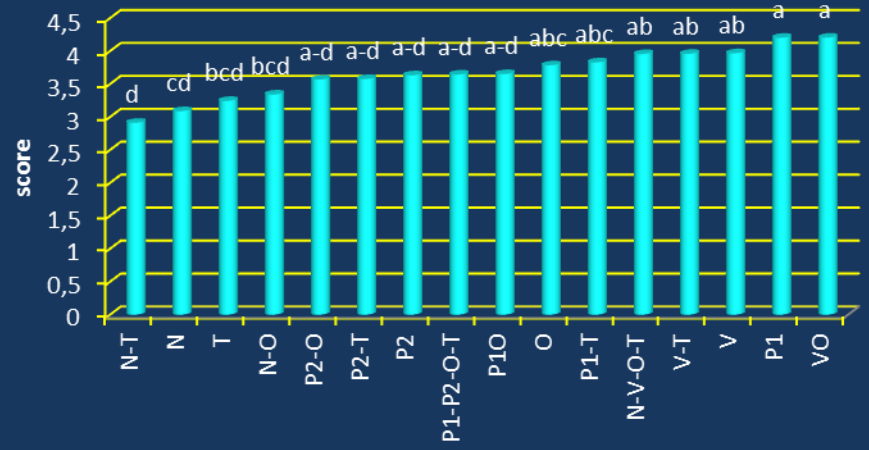
forage quality



interest as crop



interest as feed



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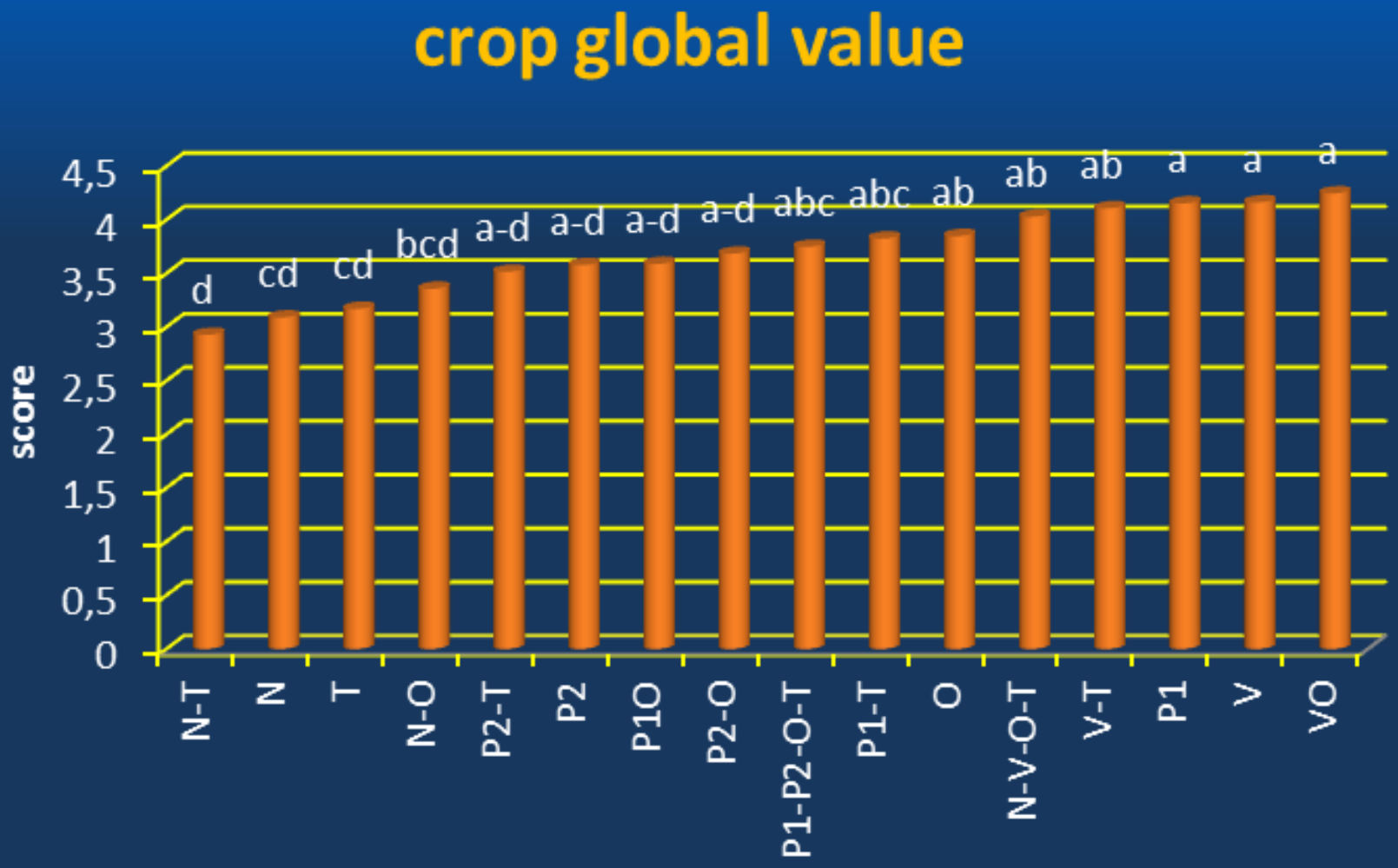

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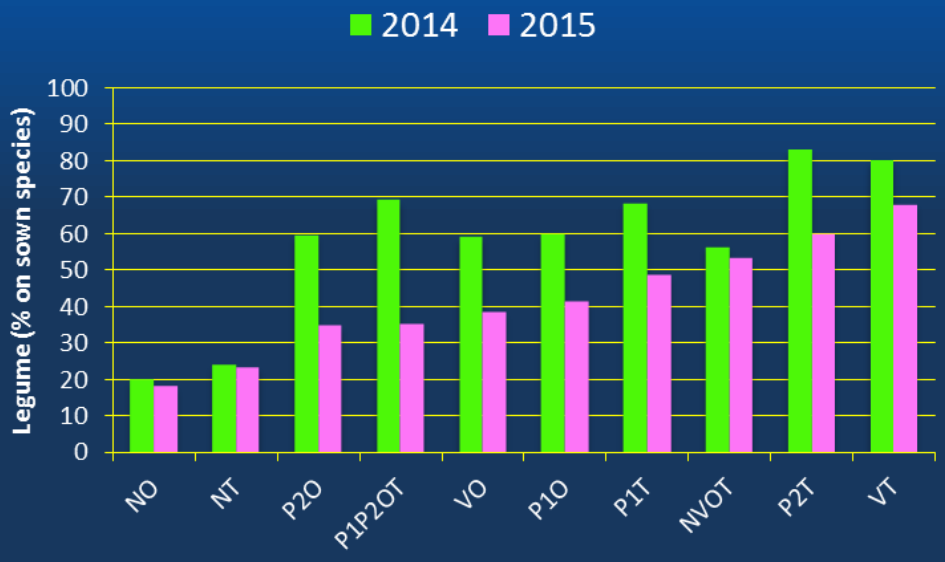
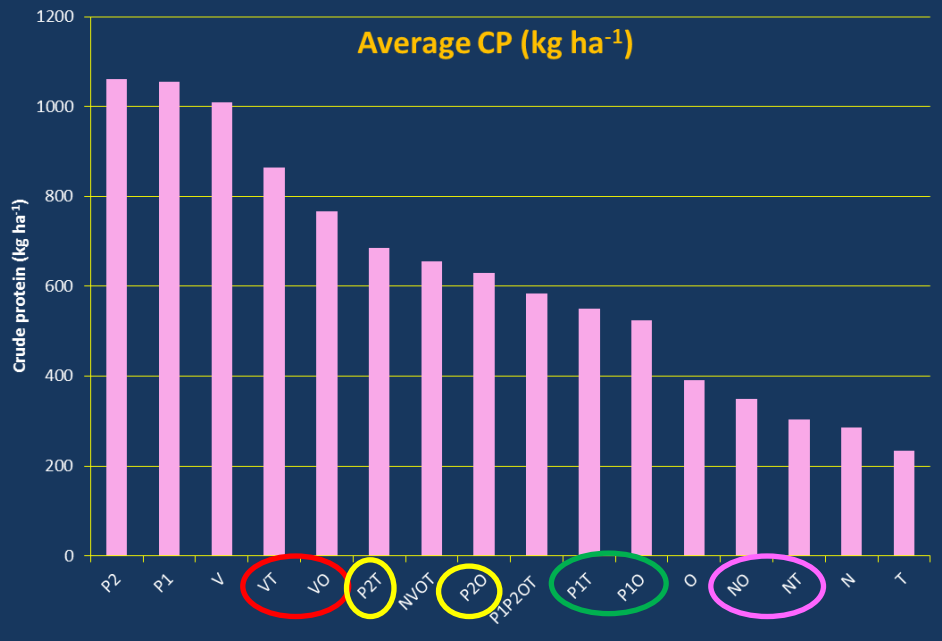
Results

Legume rate contribution in mixtures



Crude protein harvest on hectare basis – average 2014 and 2015



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Conclusions

✓These preliminary results allowed to identify some winter cereal-legume mixtures with high forage production and quality i.e. VT and P2T

✓The participatory approach involving farmers revealed to be an important tool to better evaluate new crops and meet farmers' requirements

Thank you for your attention!

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Alghero, Sardinia (Italy) 7 – 10 May

Topic

'Grassland resources for extensive farming systems in marginal lands: major drivers and future scenarios'