



# THE COMPOST FROM THE WINE INDUSTRY AS A SOURCE OF NITROGEN IN VULNERABLE AREAS.

R. Villena Gordo<sup>1</sup>, M.T. Castellanos Serrano<sup>1</sup>, A. Arce Martínez<sup>(1,2)</sup>, A.M. Tarquis<sup>(2,3)</sup> and M.C. Cartagena Causapé <sup>(1,2)</sup>.

- (1) Dpto. Química y Tecnología de los Alimentos - E.T.S.I.A.A.B. – UPM
- (2) CEIGRAM-UPM
- (3) Grupo de Sistemas Complejos, UPM Madrid, Spain.



# Introduction

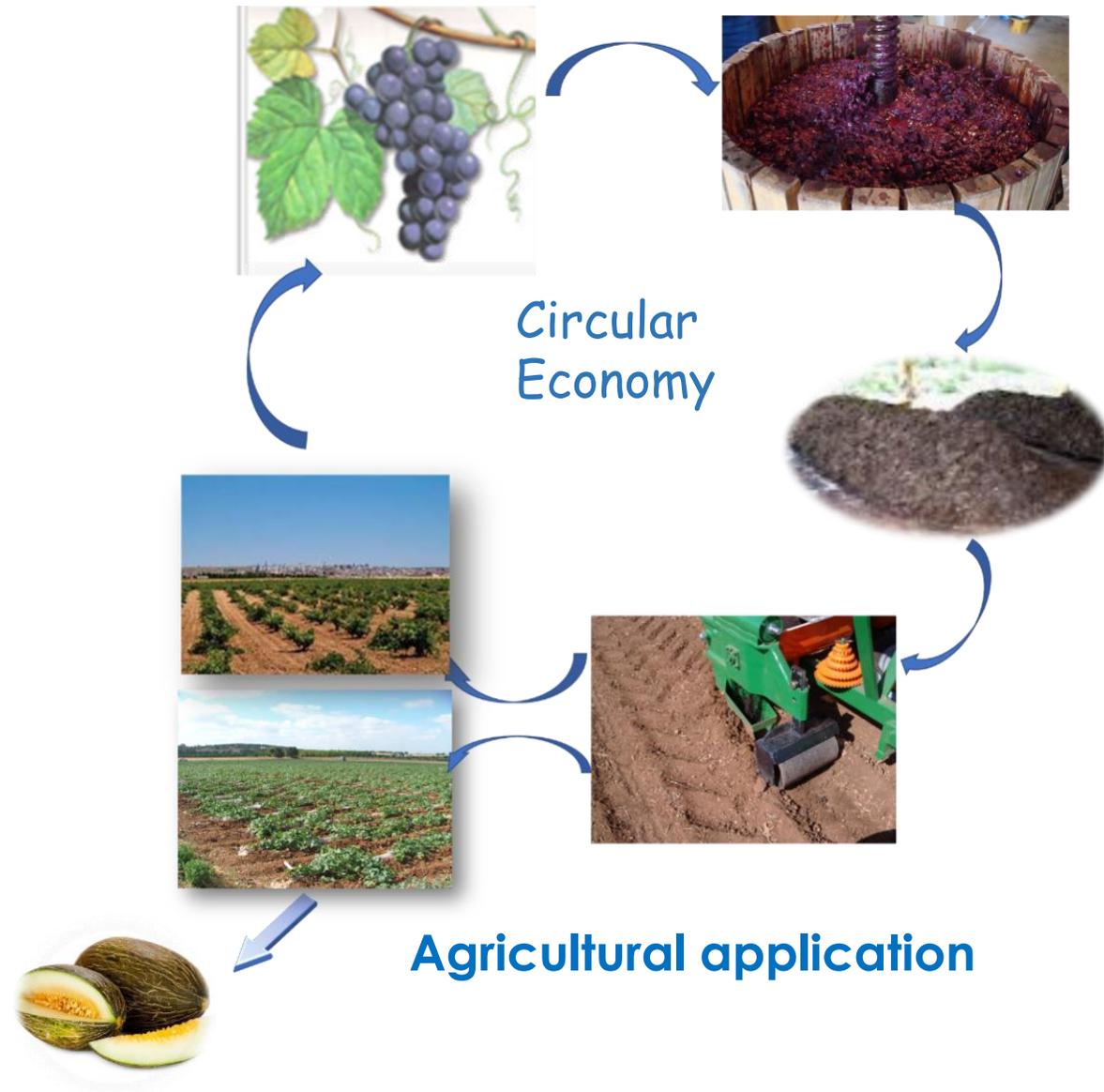
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- Spain is the third producer of wine of the world (44,4 Mill.hl) and the country with more vineyard area (969.000 ha).
- The large quantity of organic wastes generated by winery industry (2-3 Mill Mg year) constitutes a serious environmental concern.
- Spain is the ninth producer of melon in Europe (46%).

# Wastes generation



# COMPOST FROM WINE INDUSTRY: VALORIZATION



# VULNERABLE ZONE

Water  $\text{NO}_3^-$  concentration: 200 ppm

Fertirrigation  
 $\text{NH}_4\text{NO}_3$

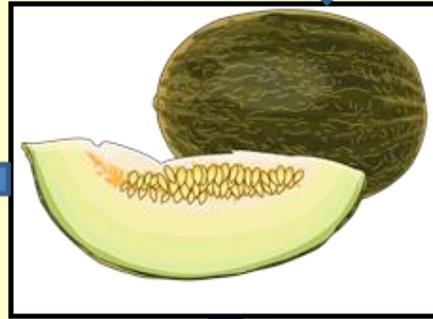
Compost of  
wine industry

Agronomic  
assessment

Environmental  
assessment

Residual effect

SOIL



# OBJECTIVE

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- ✓ Could compost from the wine industry be an alternative to traditional fertilization (fertirrigation), in a vulnerable area ?
- ✓ What agronomic and environmental consequences would have its application in vulnerable areas?
- ✓ What residual effect does nitrogen have on a subsequent crop, wheat?

# EXPERIMENTAL DESIGN

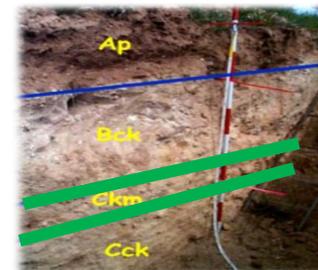
- Field trials: `La Entresierra´ Field Station (Ciudad Real).
- Petrocalcic Palexeralfs soil with a very low vertical variability up to 60 cm of depth from which there is a fragmented petrocalcic horizon.
- *Cucumis melo L.*, cv Trujillo "Piel de sapo" (1.5 x 1.5 m<sup>2</sup>, 4,444 plant ha<sup>-1</sup>).
- Fertilization: mineral and compost derived from winery wastes.
- Melon crop period from May to August.
- Random blocks, four replicates.
- Drip irrigation with plastic mulch: 100% ETc.
- Plastic mulch.
- *Triticum aestivum L.*, cv Garcia ( 0.15 m between rows , 400 seeds m<sup>-2</sup>).
- Wheat crop period from November to July.
- Fertirrigation NH<sub>4</sub>NO<sub>3</sub> :from 11 to 393 (kg N ha<sup>-1</sup>).
- Compost from the wine industry: doses (D<sub>1</sub>) 6,7, (D<sub>2</sub>) 13,3 and (D<sub>3</sub>) 20,0 (Mg ha<sup>-1</sup>).



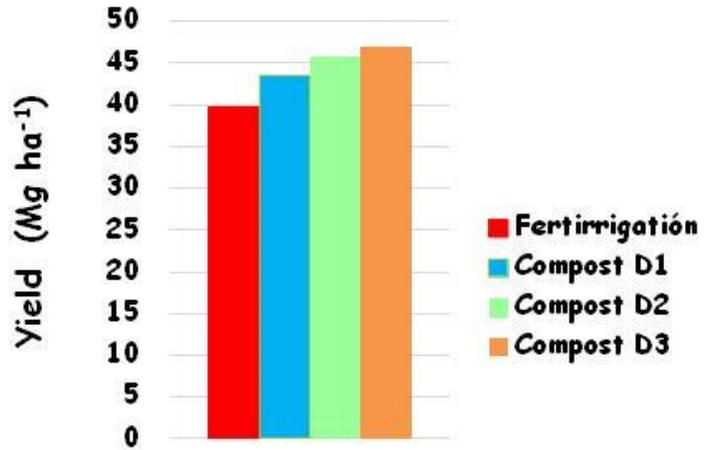
# EXPERIMENTAL DESIGN

## CHARACTERISTICS OF

Compost		Irrigation water		Soil	
Humidity (%)	16,4	pH	7,9	pH	8,4
pH	9,8	EC (mS m <sup>-1</sup> )	2,9	EC (mS m <sup>-1</sup> )	0,2
EC (mS m <sup>-1</sup> )	1,0	N-NH <sub>4</sub> <sup>+</sup> (mg L <sup>-1</sup> )	0,1	OM (g kg <sup>-1</sup> )	24,1
C/N ratio	12	N-NO <sub>3</sub> <sup>-</sup> (mg L <sup>-1</sup> )	125,2	N Kjeldahl (g kg <sup>-1</sup> )	1,1
N organic (%)	2,8	SO <sub>4</sub> <sup>2-</sup> (mg L <sup>-1</sup> )	1214,6	N-NH <sub>4</sub> <sup>+</sup> (mg kg <sup>-1</sup> )	1,7
N Kjeldahl (%)	3,0	Cl <sup>-</sup> (mg L <sup>-1</sup> )	194,6	N-NO <sub>3</sub> <sup>-</sup> (mg kg <sup>-1</sup> )	15,3
N-NH <sub>4</sub> <sup>+</sup> (mg kg <sup>-1</sup> )	1,5	K <sup>+</sup> (mg L <sup>-1</sup> )	3,6	Available P (mg kg <sup>-1</sup> )	22,1
N-NO <sub>3</sub> <sup>-</sup> (mg kg <sup>-1</sup> )	283,0	Ca <sup>2+</sup> (mg L <sup>-1</sup> )	275,0	Available K (mg kg <sup>-1</sup> )	410,7
Organic C (%)	31,8	Mg <sup>2+</sup> (mg L <sup>-1</sup> )	172,0	Available Ca (mg kg <sup>-1</sup> )	1649,3
Total P (%)	0,8			Available Mg (mg kg <sup>-1</sup> )	461,2
Total K (%)	3,8				
Available Ca (%)	0,63				
Available Mg (%)	0,64				

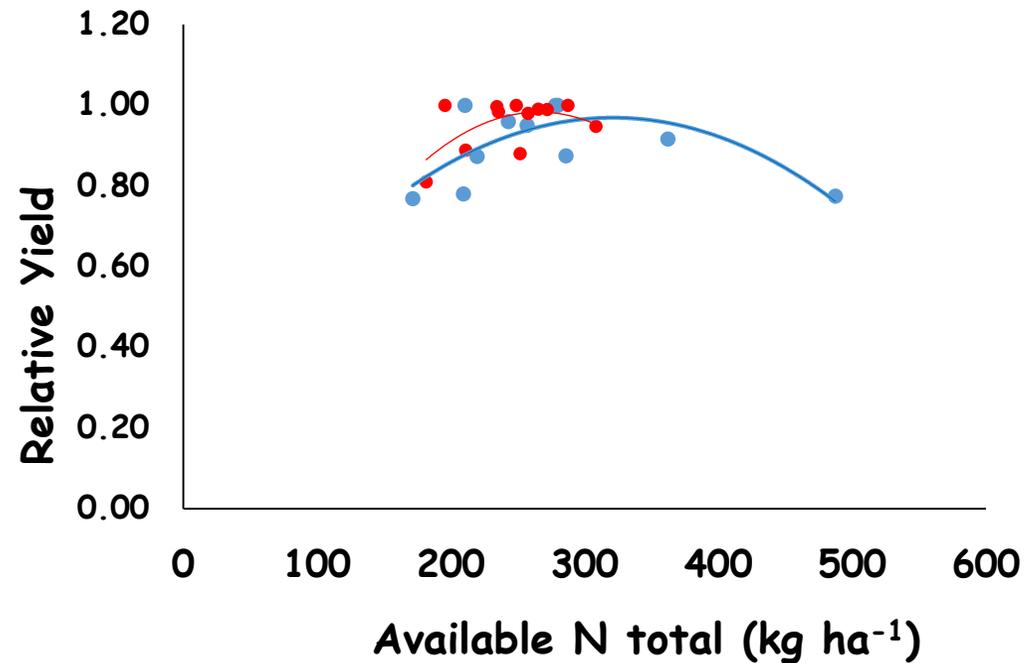


# RESULTS: MELON CROP YIELD

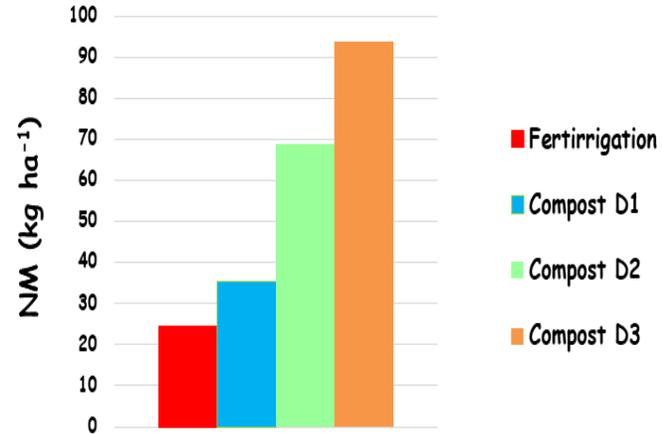


Fertirrigación : Maximum relative yield with 315 kg available N total

Compost : Maximum relative yield with 267 kg available N total



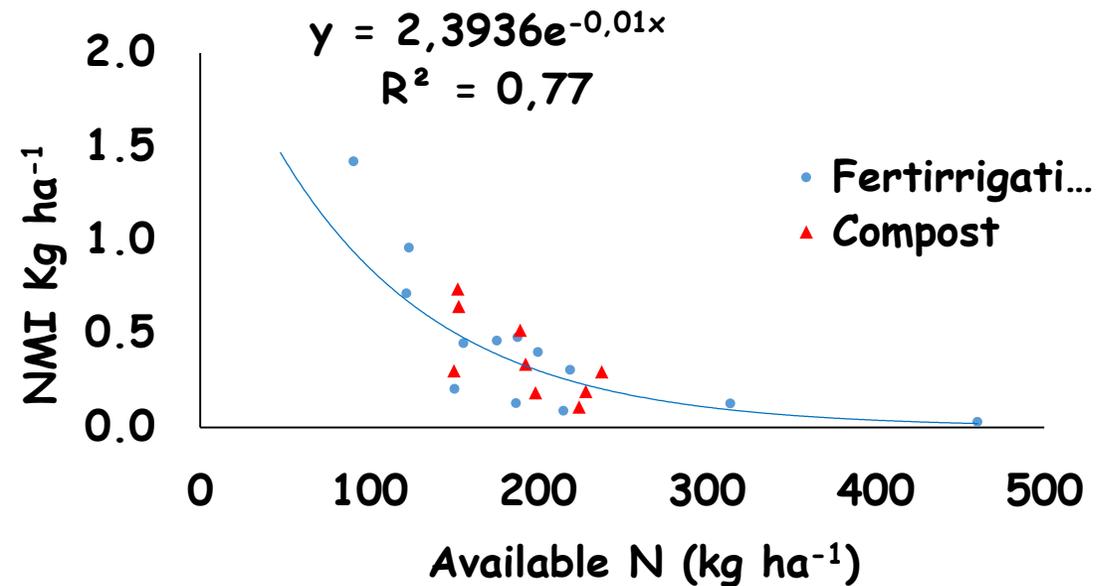
# RESULTS: NITROGEN MINERALIZATION INDEX (NMI)



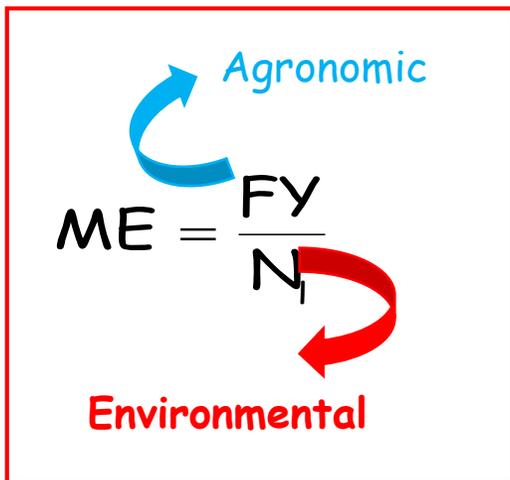
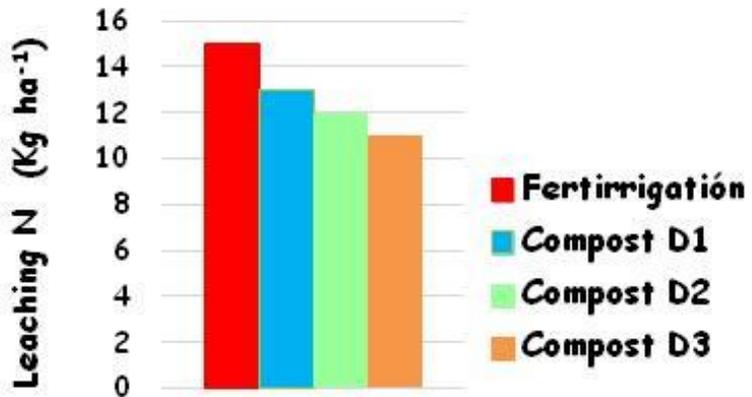
$$NMI = \frac{NM}{N_{av}}$$

NM, Nitrogen mineralized (Kg ha<sup>-1</sup>)

N<sub>av</sub>, N available (kg ha<sup>-1</sup>)

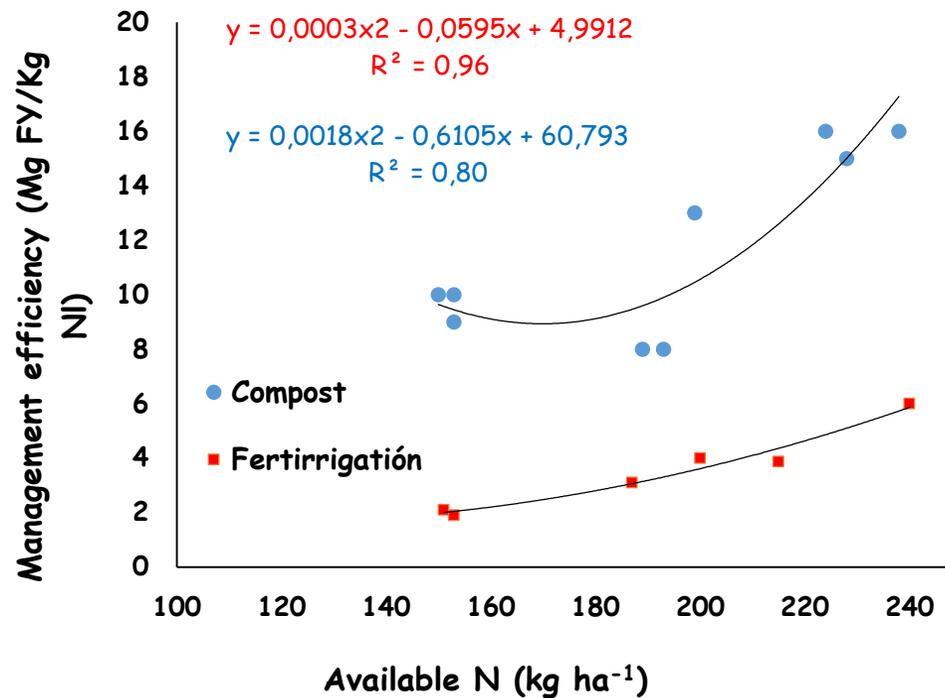


# RESULTS: MANAGEMENT EFFICIENCY (ME)

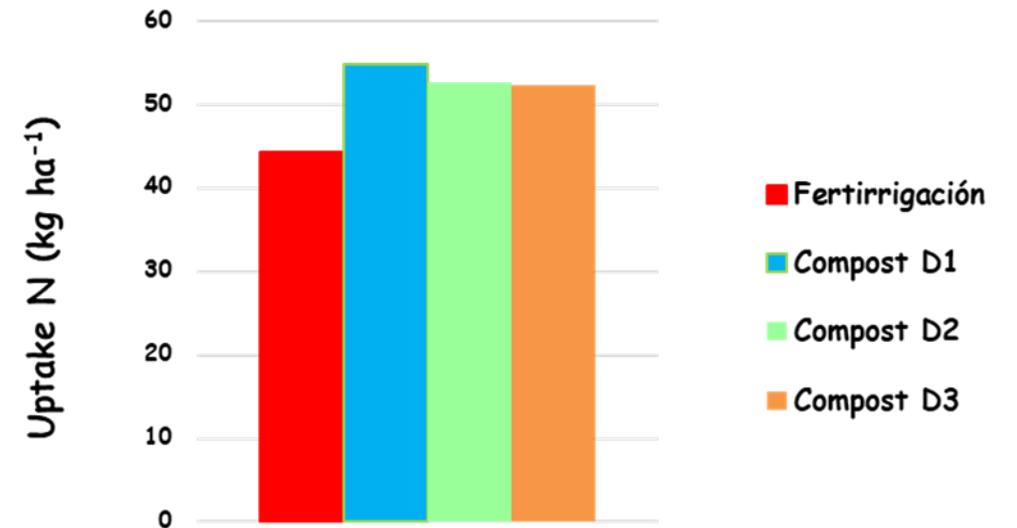
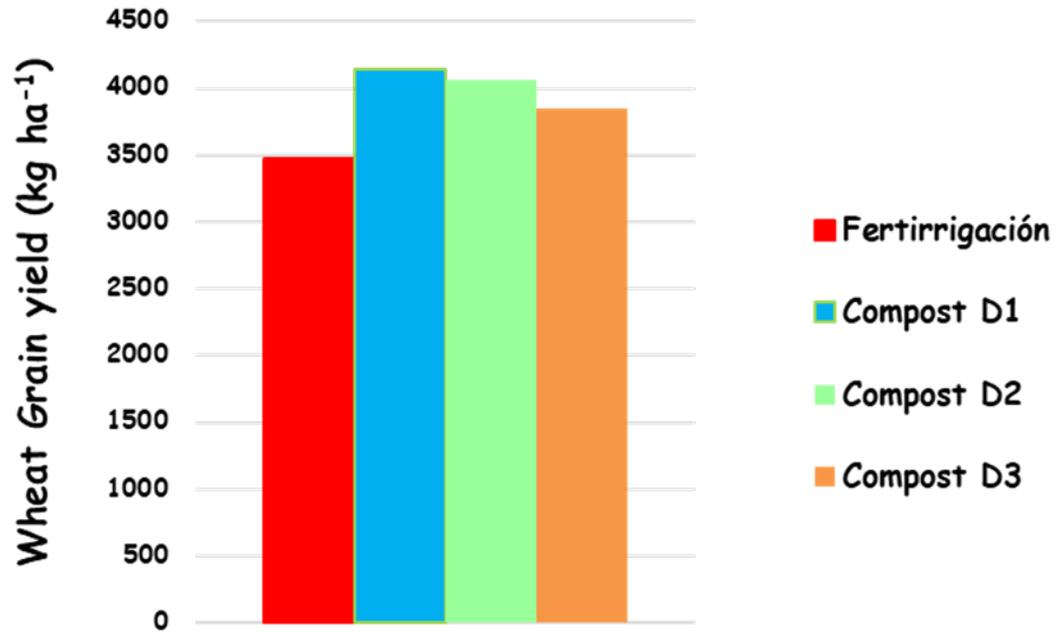


FY, Fruit yield (Mg ha<sup>-1</sup>)

$N_i$ , N leaching (kg ha<sup>-1</sup>)



# RESULTS: RESIDUAL EFFECT IN WHEAT



# CONCLUSIONS

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- ✓ The amount of leached nitrogen decreased considerably with the use of compost with respect to fertirrigation.
- ✓ Improved the production and extraction of nitrogen by the crop proportionally to the dose of compost added with respect to fertirrigation .
- ✓ With the application of compost, 15% less N is needed to obtain the highest relative production.
- ✓ The environmental risk decreases with the application of compost against fertirrigation.



Sponsored by:



R. Villena, M.T. Castellanos, A. Arce, A.M. Tarquis & M.C. Cartagena

Thank you for your attention!!

