Apparent soil electrical conductivity as a guidance for canopy management in vineyards

Henrique Oldoni[1], Bruno R. S. Costa[1], Ladislau M. Rabello[2], Luís H. Bassoi[2]

[1]College of Agricultural Sciences, São Paulo State University, Botucatu, São Paulo, Brazil.

[2]Embrapa Instrumentation, São Carlos, São Paulo, Brazil

Introduction

❑ Data acquisition: performance in a fast and less labor intensive way to characterize the field spatial variability is desirable.

❑ Apparent soil electrical conductivity (ECa) is well associated with physical and chemical soil attributes, which also affect plant growth and development.

Objective: to evaluate the appropriateness of ECa homogeneous zones delimitation in order to differentiate vegetative vigor and yield of drip irrigated grapevines.
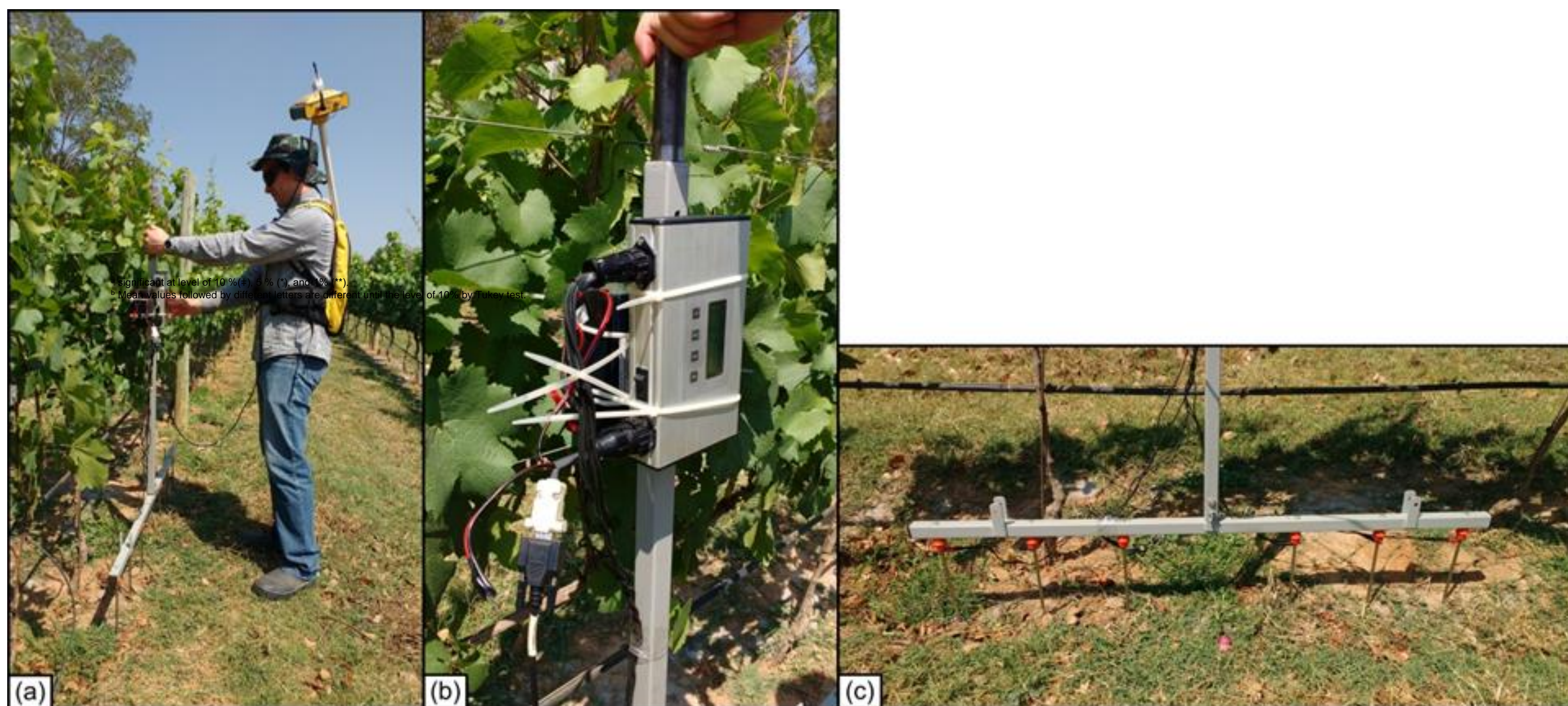
Material and Methods

Fig. 1. Measurement of ECa by a handheld device along the plant row (a), data acquisition unit (b) and stainless steel rods in contact with the soil surface to apply an electrical current and to measure voltage (c). Photos: L. H. Bassoi
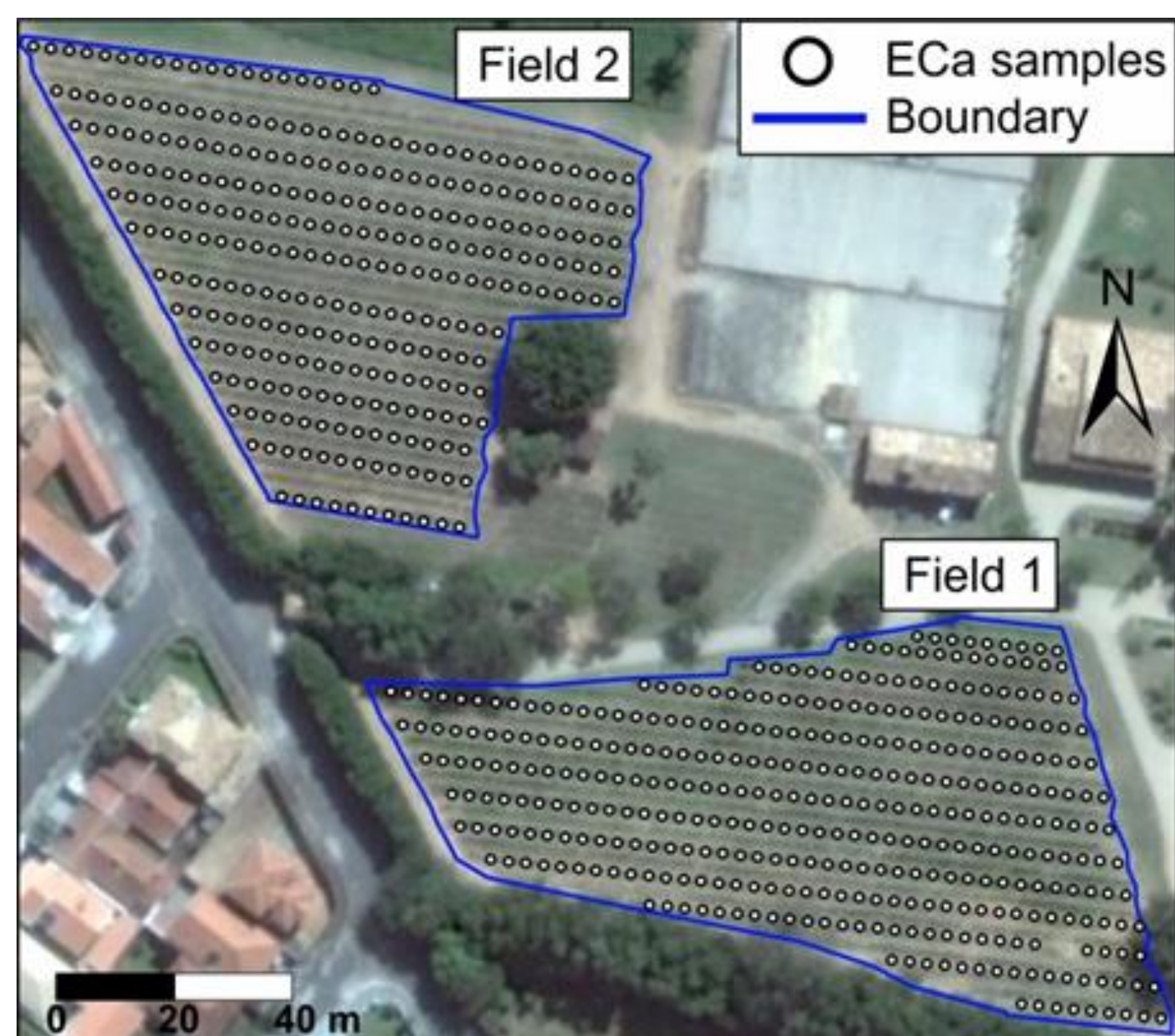

Fig. 2. Points of ECA measurement inside the fields 1 and 2 in the 'Chardonnay' vineyard. Source: Adapted from Google Earth.
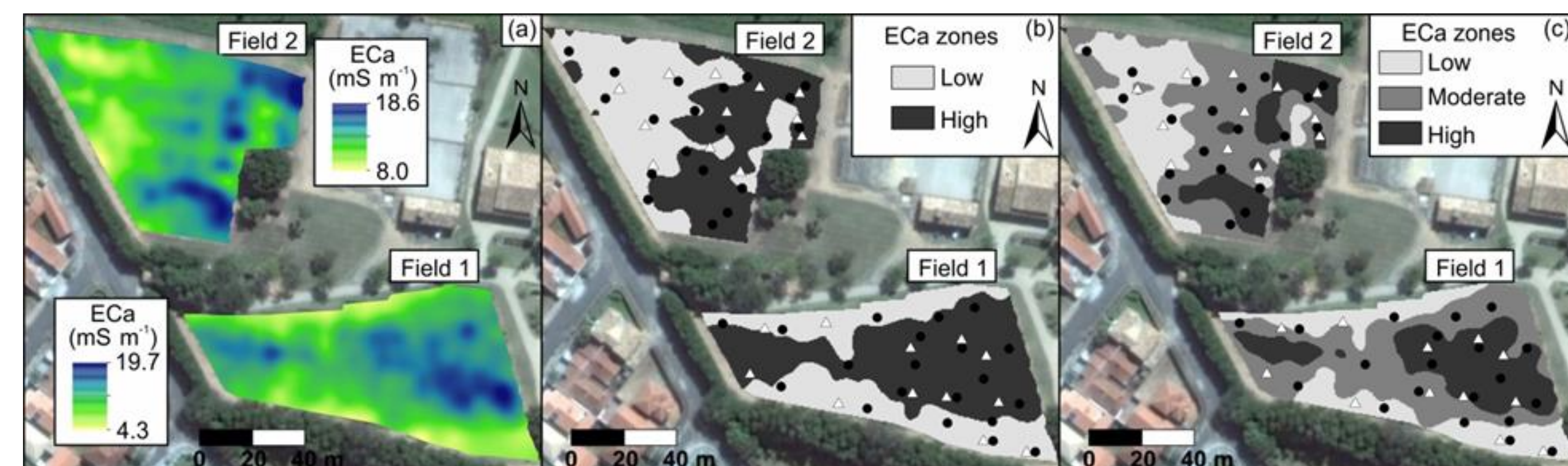
Results and Discussion

Fig. 3. Maps of spatial distribution of apparent soil electrical conductivity (ECa, mS m^{-1}) in the upper 0.4 m soil layer (a) and maps with two (b) and three (c) homogeneous zones of ECa delimited in fields 1 and 2 in the 'Chardonnay' vineyard. Black circles and white triangles indicate the plants where data of production and vegetative vigor were measured, respectively.

Table 3. Number of clusters (NC), average cluster weight (ACW) and total cluster weight (TCW) per plant, and fresh pruning weight (FPW) in two and three homogeneous zones of apparent soil electrical conductivity (ECa, mS m^{-1}) in fields 1 and 2 in the 'Chardonnay' vineyard.

Zone	Field 1				Field 2			
	NC	ACW (g cluster^{-1})	TCW (kg plant^{-1})	FPW (kg plant^{-1})	NC	ACW (g cluster^{-1})	TCW (kg plant^{-1})	FPW (kg plant^{-1})
Low	11 a[b]	66.3 b	0.74 b	0.269 b	11 a	78.1 b	0.88 b	0.36 b
High	13 a	83.8 a	1.08 a	0.432 a	15 a	92.1 a	1.39 a	0.45 a
Low	10 a	67.3 b	0.70 b	0.264 b	11 b	79.7 a	0.86 b	0.36 ab
Moderate	12 a	70.8 b	0.84 ab	0.276 b	12 b	87.5 a	1.09 b	0.36 b
High	14 a	90.8 a	1.26 a	0.497 a	20 a	92.2 a	1.85 a	0.49 a

[a] significant at level of 10 %(‡), 5 % (*), and 1% (**).
[b] Mean values followed by different letters are different until the level of 10% by Tukey test.

Conclusion

❑ Homogeneous zones of ECa were suitable for the differentiation of vegetative vigor and yield in a drip irrigated 'Chardonnay' vineyard located in Southeast Brazil.

❑ The split of vineyard area in only two zones was enough to observe the difference among the plant attributes.