

# SIG para AP

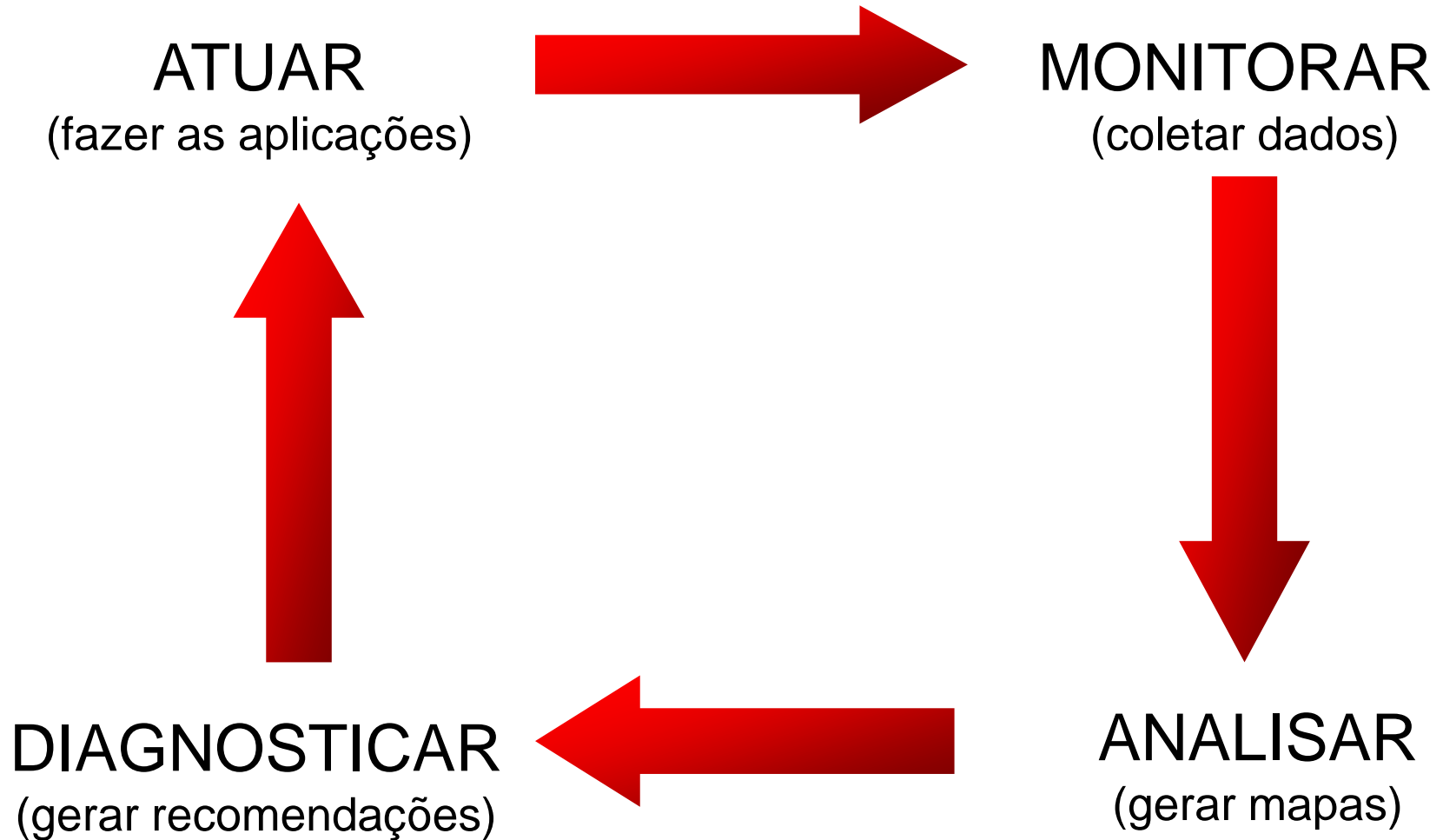
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ESALQ/USP  
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# Objetivo

Abordar conceitos básicos de SIG e  
uma visão de mercado sobre SIG  
dedicados à agricultura de precisão

# Ações





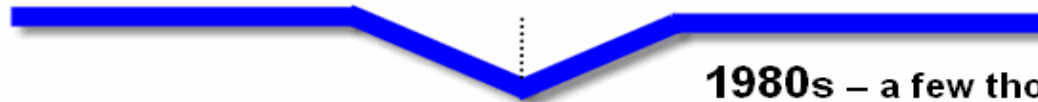
# Sistema de Informação Geográfica – SIG (GIS)

- SIG é software
- Essencialmente permite trabalhar com dados georreferenciados:
  - organização
  - edição
  - análise
  - visualização
  - armazenamento

General Programmers   GIS Developers   System Managers   Data Providers   GIS Specialists   General Users   Public Users



**1970s** – a few hundred innovators establishing the foundation of geotechnology



**1980s** – a few thousand pacesetters applying the technology to a small set of disciplines (RS, GIS)



**1990s** – hundreds of thousands GIS specialists and general users (RS, GIS, GPS)



**2000s** – millions of general and public users (RS, GIS, GPS, MMM)

Figure 41.1. The evolution of the Geotechnology Community has broadened its membership in numbers, interests, backgrounds and depth of understanding.

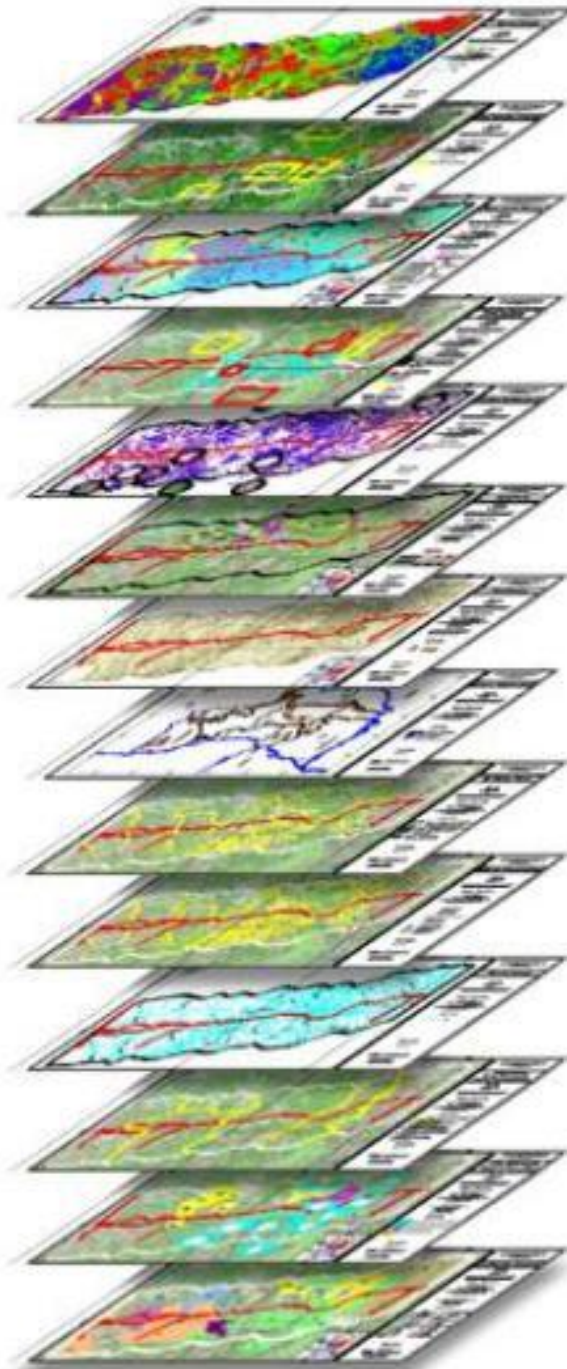
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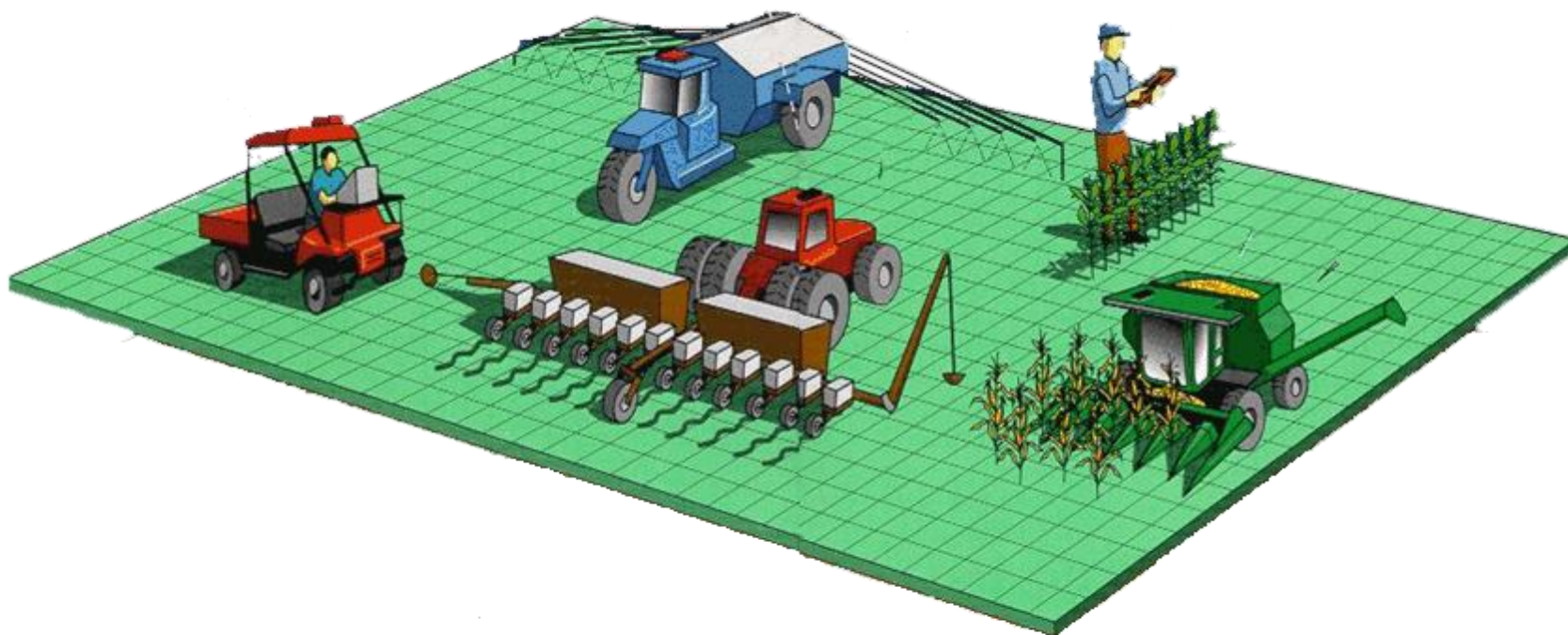
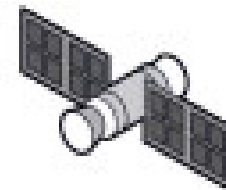
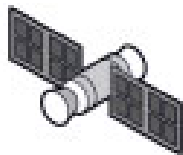
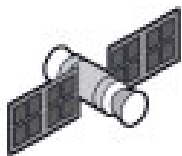
# SIG para AP



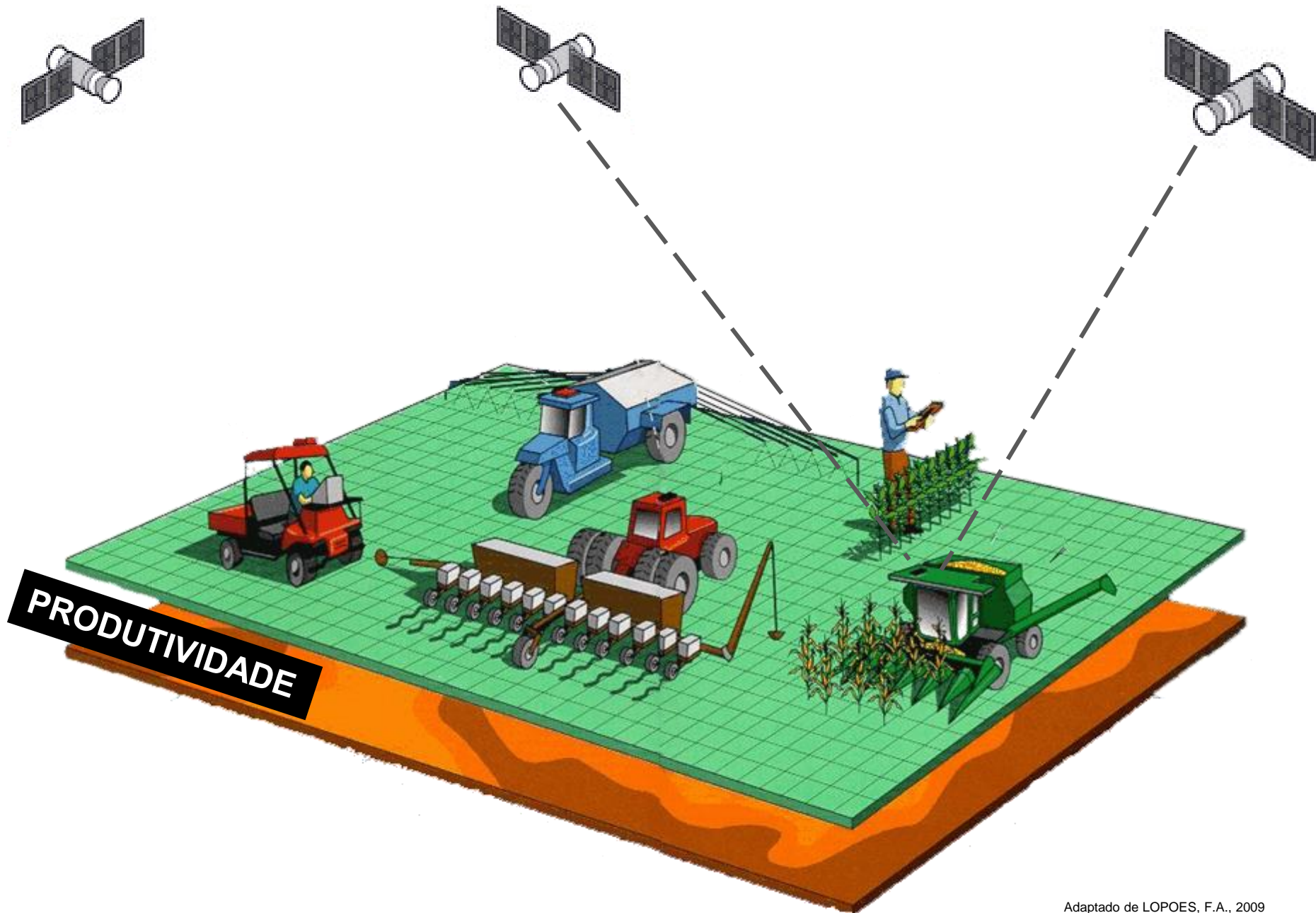
As informações  
virtualmente  
podem ser  
organizadas em  
camadas para  
análises e  
operações  
matemáticas



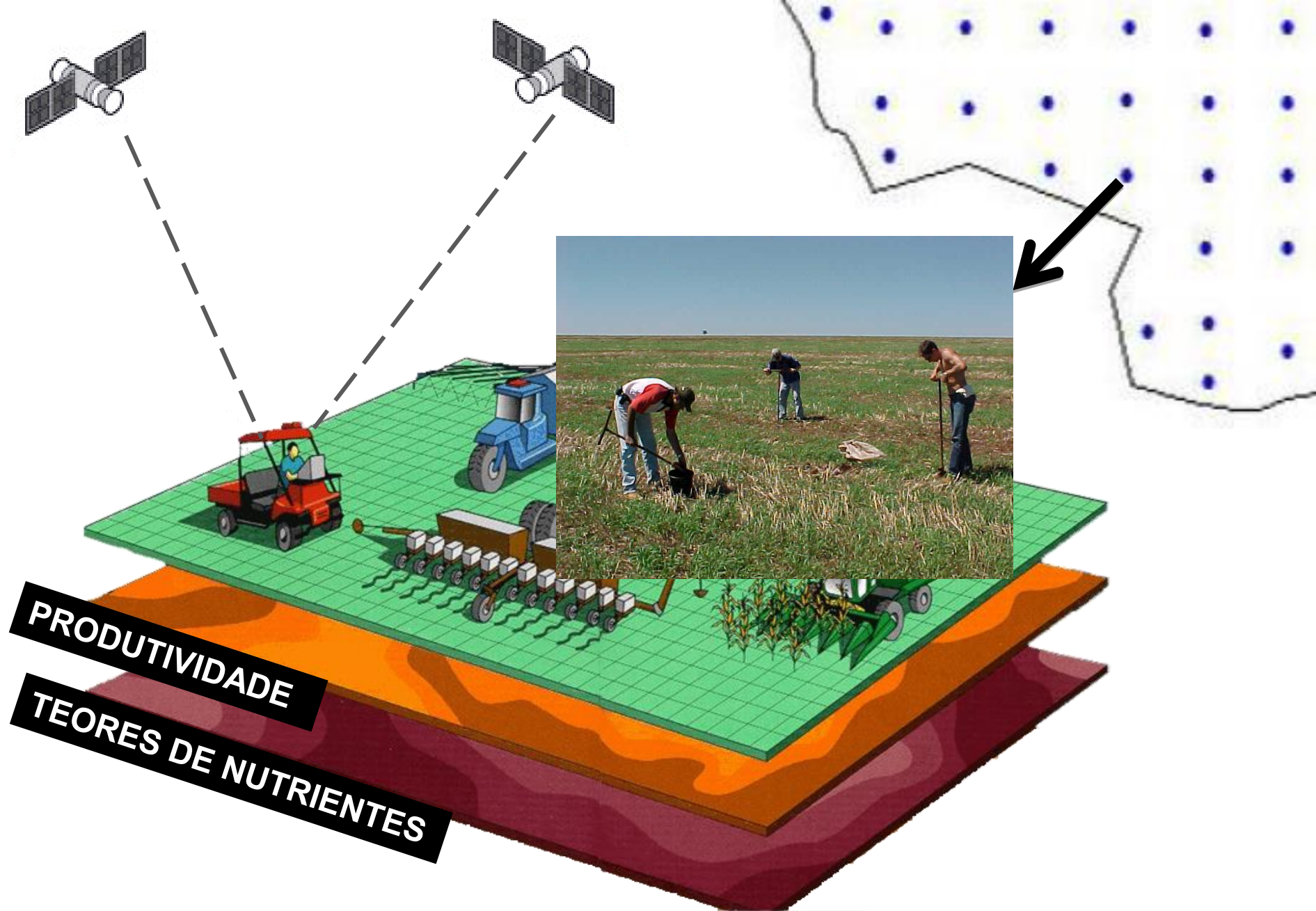




Adaptado de LOPOES, F.A., 2009

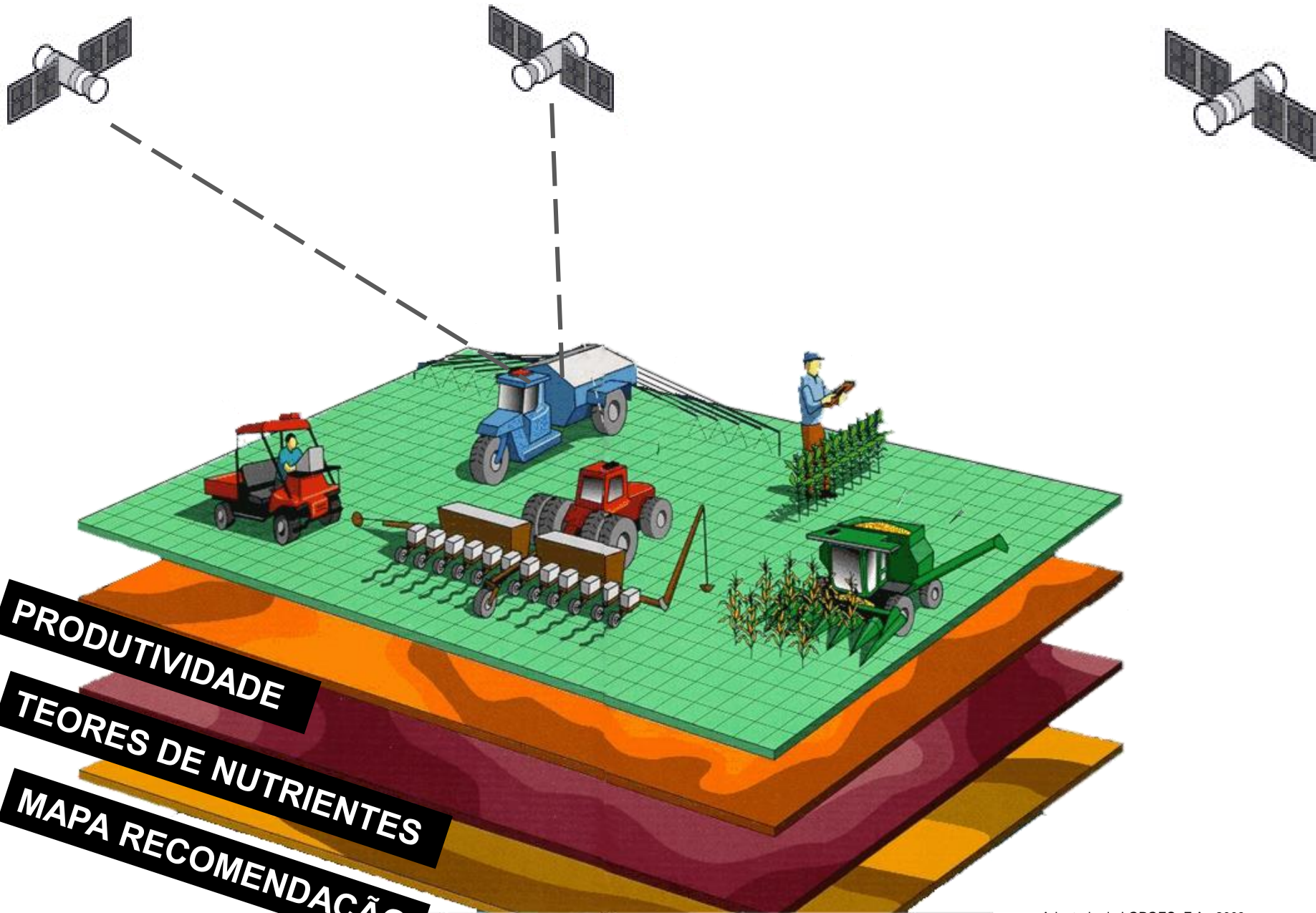


Adaptado de LOPOES, F.A., 2009

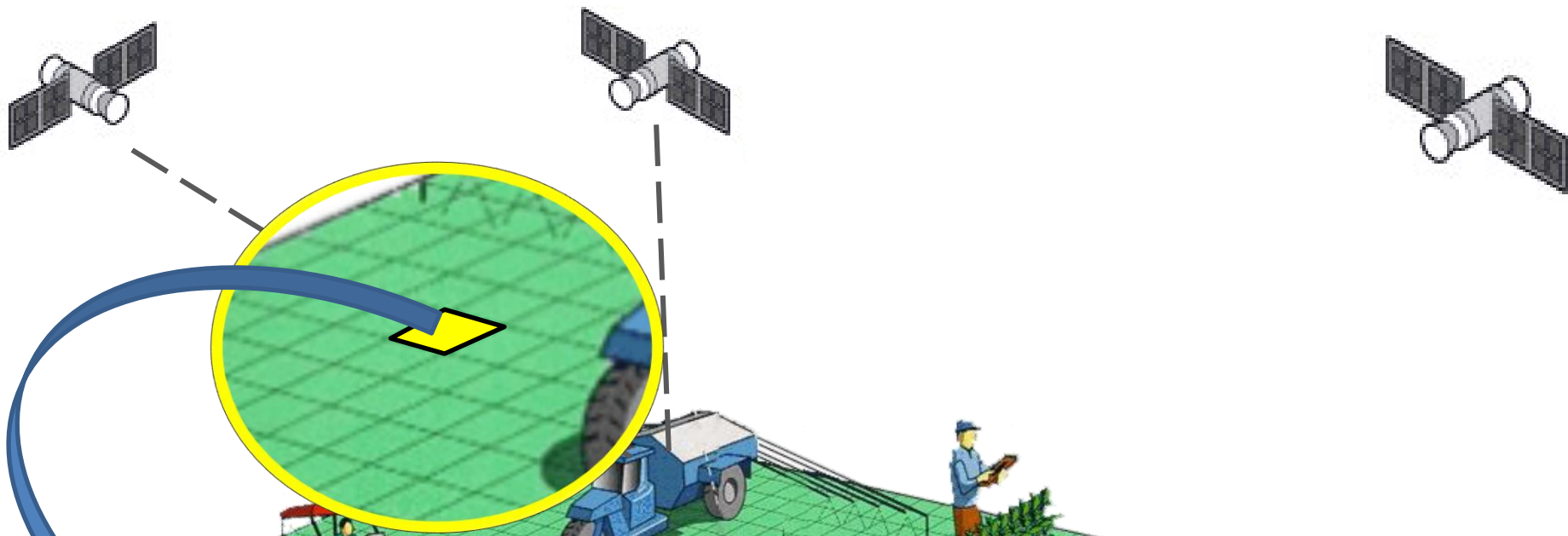


Adaptado de LOPOES, F.A., 2009





Adaptado de LOPOES, F.A., 2009

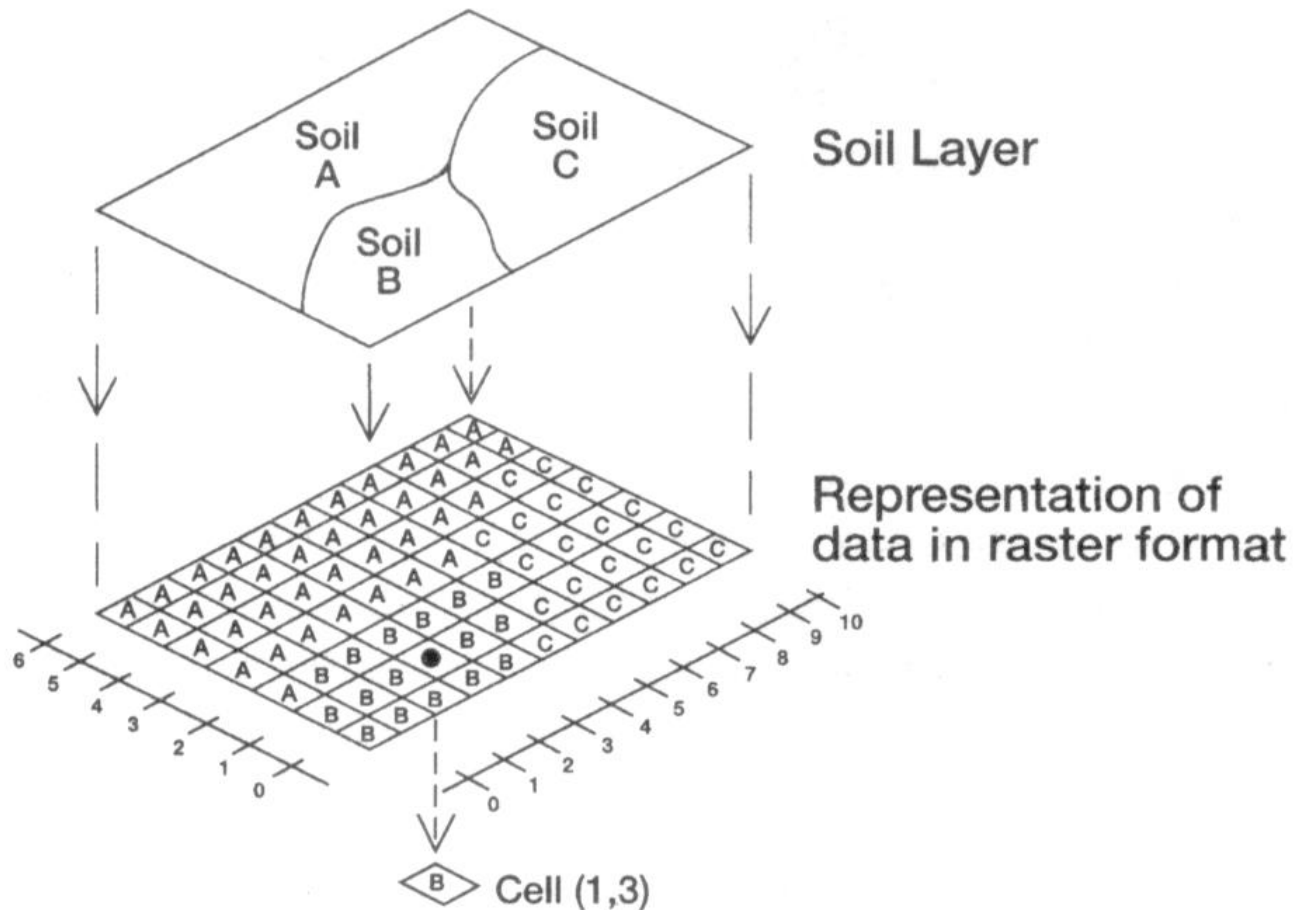


	A	B	C	D	E	F	G	H	I	J	K	L
1	Produtividade				Folha		Solo					
2	ID	Longitude	Latitude	Real (t/ha)	Esperada (t/ha)	N (g/kg)	P (mg/dm <sup>3</sup> )	K (mmol <sub>c</sub> /dm <sup>3</sup> )	K% CTC	V (%)	CTC (mmol <sub>c</sub> /dm <sup>3</sup> )	NC (t/ha)
3	43	-48.64712778	-22.94836277	20.35	16.3	22.8	4.9007	0.8	2.19	40.46	36.6	1.08
4	44	-48.64703022	-22.94836277	19.84	15.9	22.8	4.8331	0.8	2.19	40.52	36.5	1.08
5	114	-48.64722533	-22.94827293	20.74	16.6	22.7	5.0204	0.8	2.17	40.80	36.9	1.08
6	115	-48.64712778	-22.94827293	19.96	16.0	22.7	4.9039	0.8	2.19	40.39	36.6	1.08
7	116	-48.64703022	-22.94827293	17.18	13.7	22.8	4.8528	0.8	2.19	40.74	36.6	1.07
8	185	-48.64732288	-22.94818310	21.68	17.3	22.7	5.1326	0.9	2.37	43.12	37.9	1.02
9	186	-48.64722533	-22.94818310	21.58	17.3	22.7	5.0086	0.8	2.17	40.56	36.9	1.09
10	187	-48.64712778	-22.94818310	20.85	16.7	22.7	4.9041	0.8	2.18	40.61	36.7	1.08
11	188	-48.64703022	-22.94818310	15.78	12.6	22.8	4.8718	0.8	2.17	41.37	36.8	1.05
12	189	-48.64693267	-22.94818310	15.53	12.4	22.8	4.9254	0.8	2.17	42.02	36.9	1.03
13	256	-48.64742044	-22.94809327	22.54	18.0	22.6	5.2514	0.9	2.27	47.99	39.7	0.87
14	257	-48.64732288	-22.94809327	22.23	17.8	22.6	5.0074	0.9	2.33	45.11	38.6	0.96
15	258	-48.64722533	-22.94809327	22.39	17.9	22.7	4.9284	0.8	2.13	42.24	37.5	1.04
16	259	-48.64712778	-22.94809327	21.15	16.9	22.7	4.8703	0.8	2.14	42.14	37.3	1.04
17	260	-48.64703022	-22.94809327	22.80	18.2	22.8	4.8871	0.8	2.14	42.74	37.3	1.02
18	261	-48.64693267	-22.94809327	20.91	16.7	22.8	4.9894	0.8	2.14	43.24	37.3	1.00

**PRODUTIVIDADE**  
**TEORES DE**  
**MAPA REC**

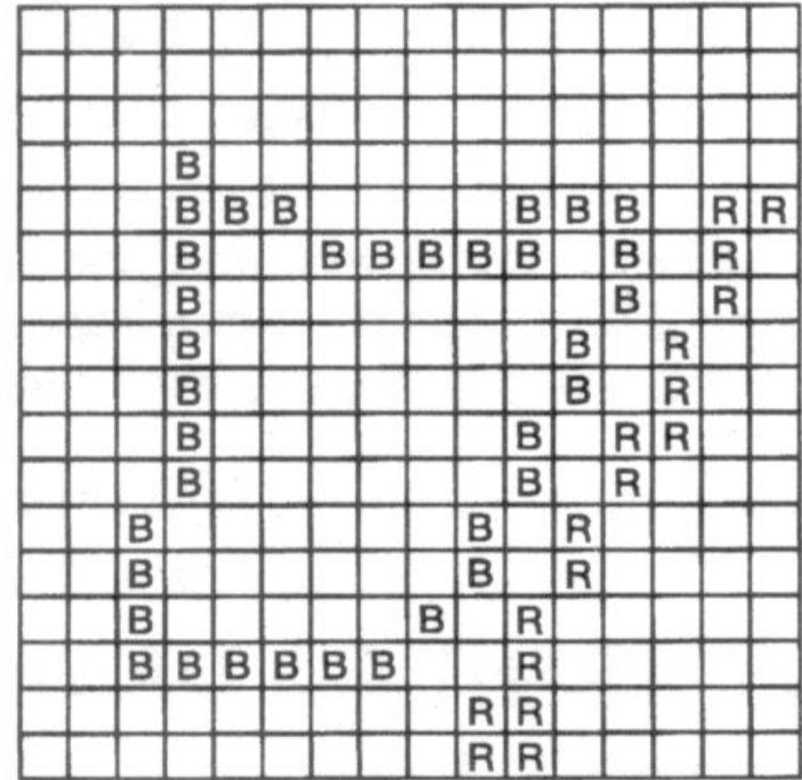
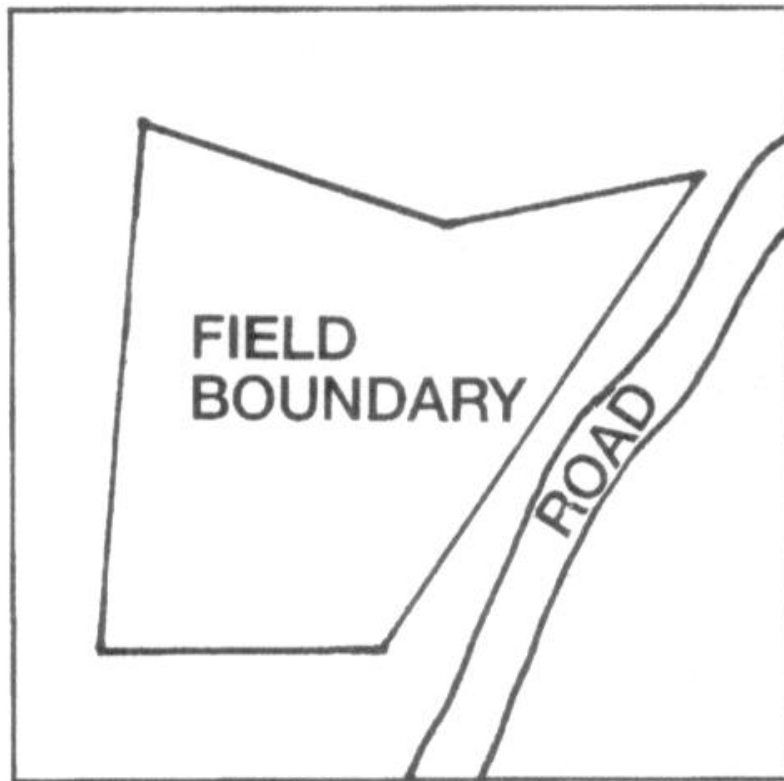


# SIG – Sistema de Informação Geográfica



No formato RASTER o espaço é dividido em células, cada célula tem um valor e este valor define a forma da apresentação visual.

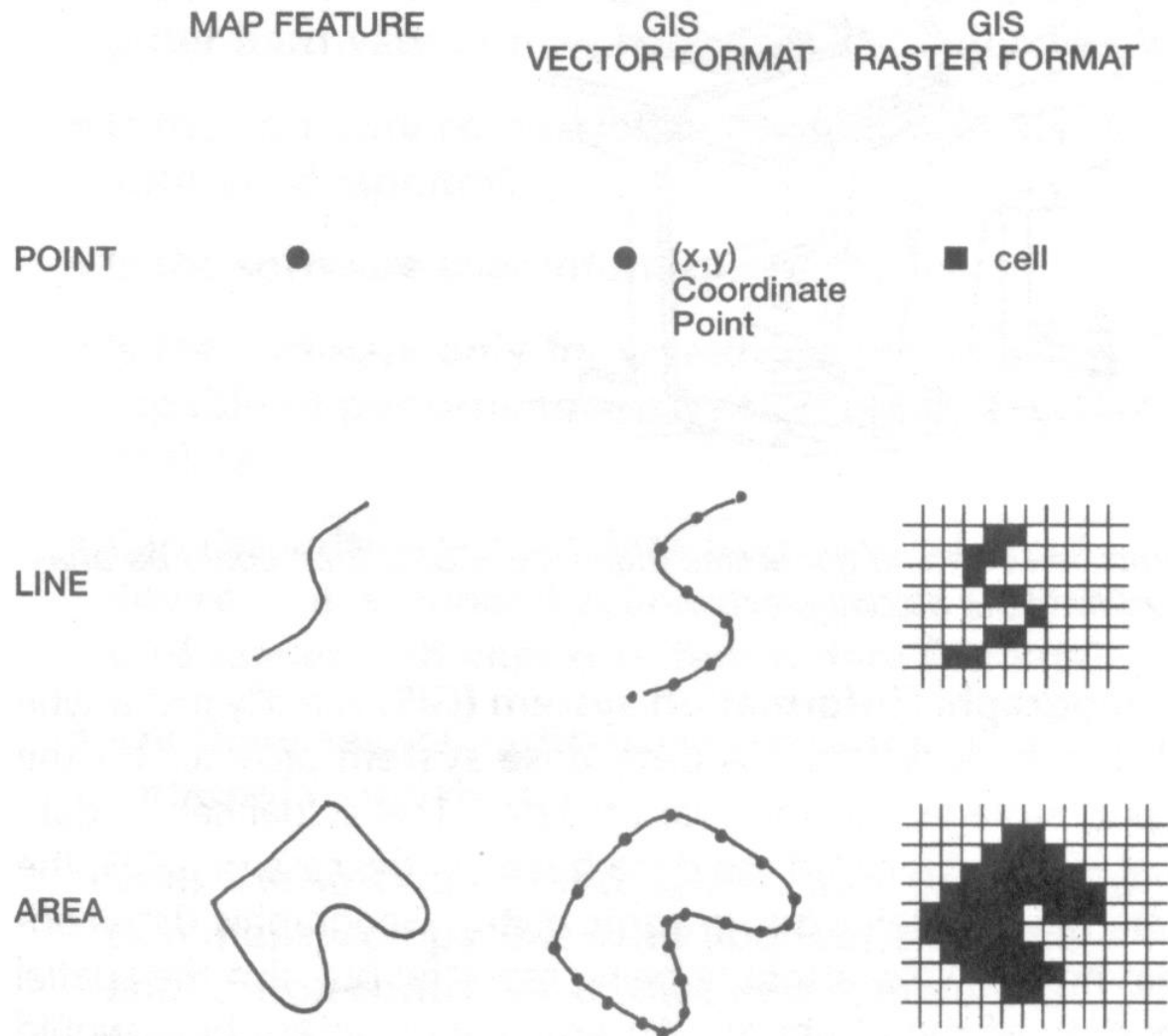
# SIG – Sistema de Informação Geográfica



RASTER REPRESENTATION OF  
FIELD BOUNDARY & ROAD

No formato VECTOR (ou Lattice), a unidade básica são pontos ou linhas com coordenadas x e y (latitude e longitude).

# SIG – Sistema de Informação Geográfica



Representações gráficas de Vector (Lattice) e Raster.

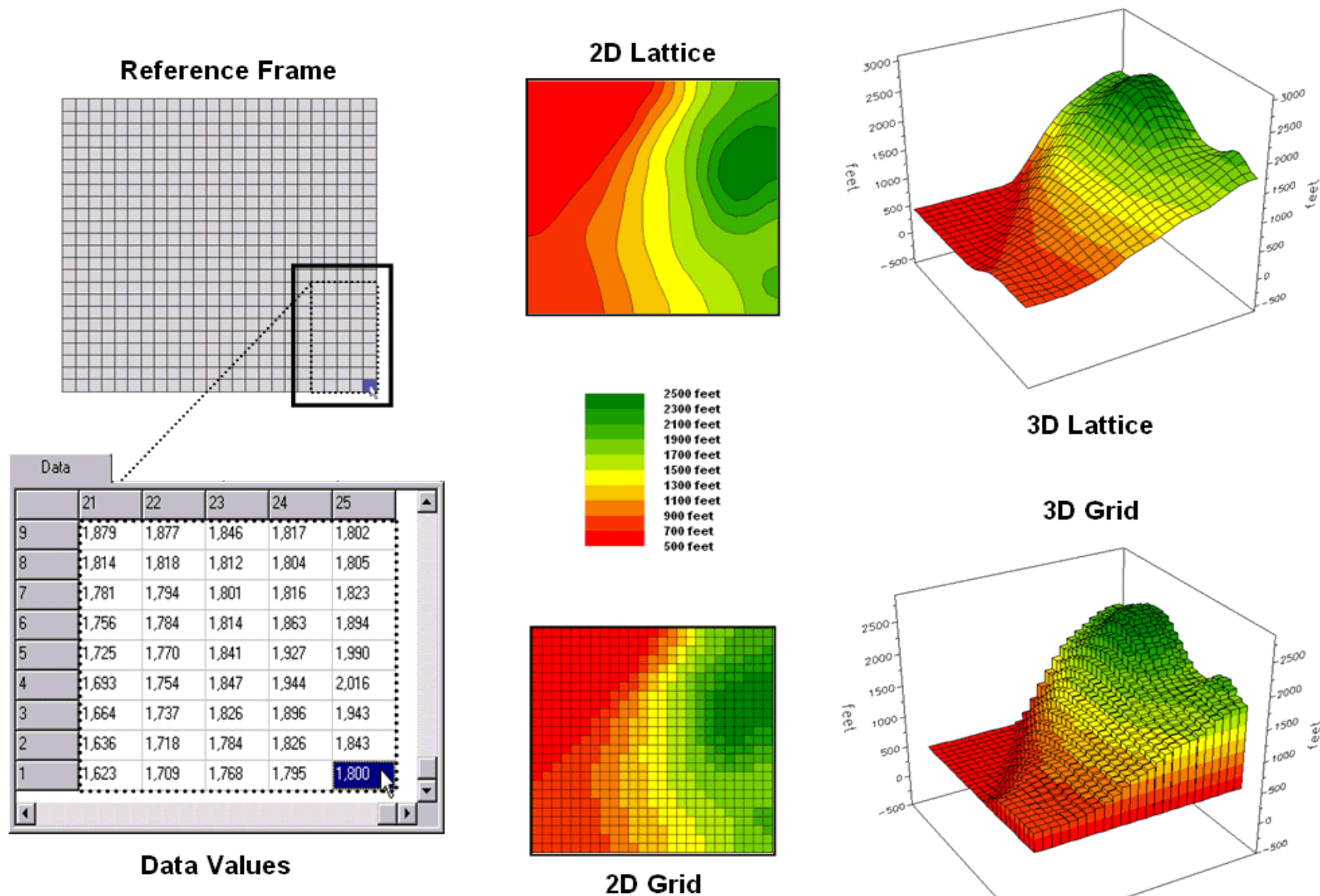
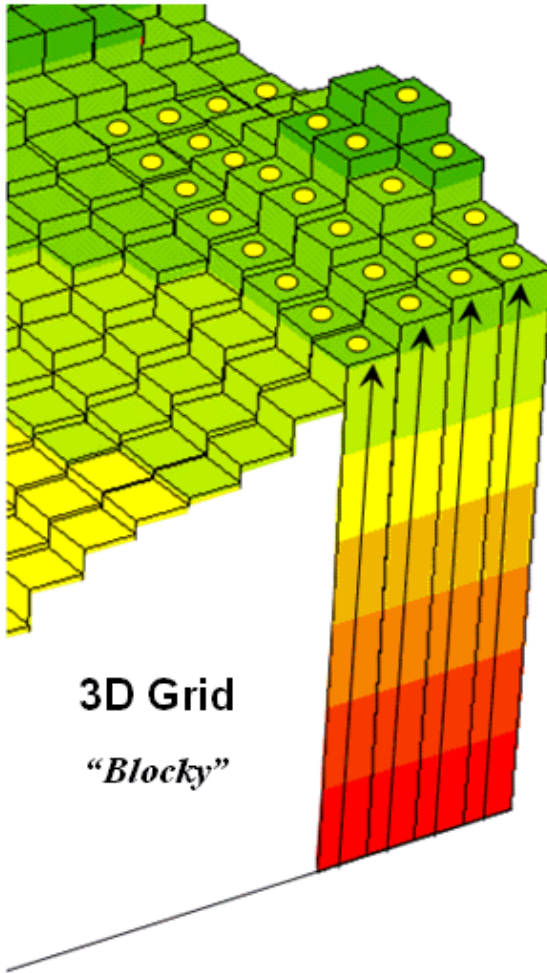


Figure 1.1. Grid-based data can be displayed in 2-D/3-D lattice or grid forms.

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*... 3D Grid display pushes  
each cell up to the level of  
the stored value*



*... 3D Lattice display  
pushes the nodes of the  
wireframe up to the value*

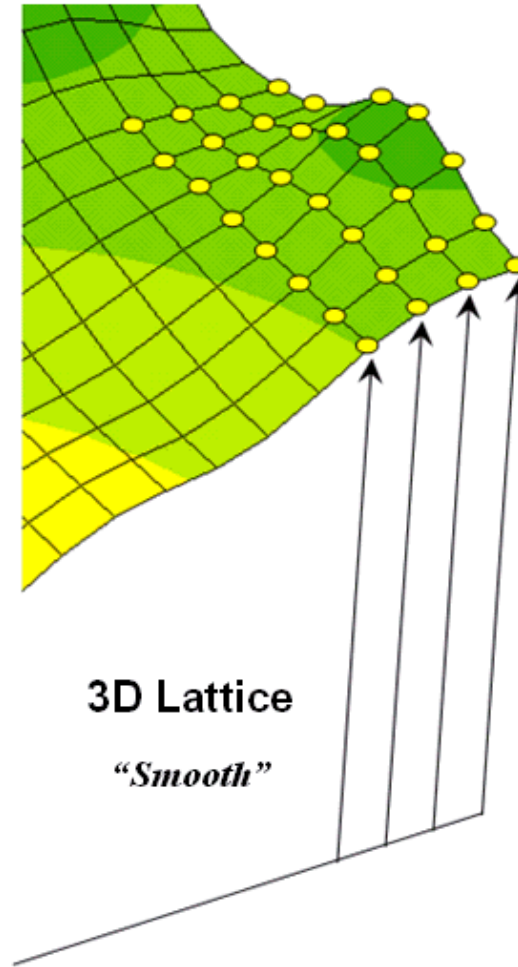


Figure 1.3. 3-D display "pushes-up" the grid or lattice reference frame to the relative height of the stored map values.

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## Mercado de SIG

### SIG genérico

ArcGIS

Erdas

ENVI

TNT Mips

GeoMedia (SISGRAFI)

Geomatica...

>R\$ 10000

SIG "livre"

Spring

QGIS

etc

SIG web para AP:

Summit (SST)

InCeres

GeoAgro (Argentina)

SIG dedicado  
para AP

SGIS

Pro - US\$ 3750 + 1030/ano

SIG básico

Programas de  
gerenciamento  
especializado

Farm Works (1)

SMS (AgLeader) (2)

Campeiro (3)

FalkerMap (4)

R\$2000 – 6000

(1) Pro – R\$ 3000

novo – R\$ 4200

(2) avançado R\$ 9500

(3) R\$ 800

(4) R\$ 1590 + treinamento

Programas que  
acompanham  
monitores e  
outros  
equipamentos  
(programas de  
mapas)

FieldStar (GTA 100)

Apex

...

<R\$1000

TrackMaker

MapSource

GeoOffice

etc <R\$200

# Exemplos de Softwares para PDA (de campo)

SMS Mobile<sup>®</sup> (<http://sms.agleader.com/products.php?Product=smsmobile>)

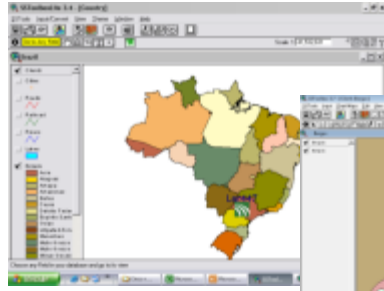
Farm Site Mate<sup>®</sup> (<http://www.farmworks.com.br/farms.html>)

HGIS<sup>®</sup> (<http://www.starpal.com/>)

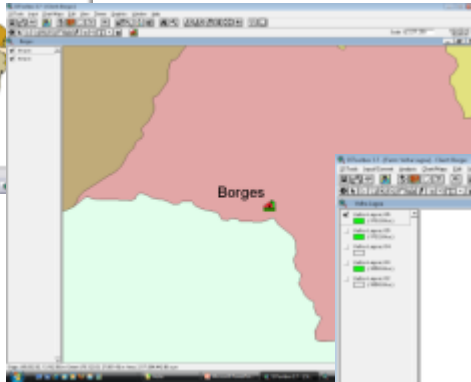
Sistema de campo CR Campeiro 7 (<http://rural.ccr.ufsm.br/>)

SST Stratus<sup>®</sup> (<http://www.sstsoftware.com/stratus.htm>)

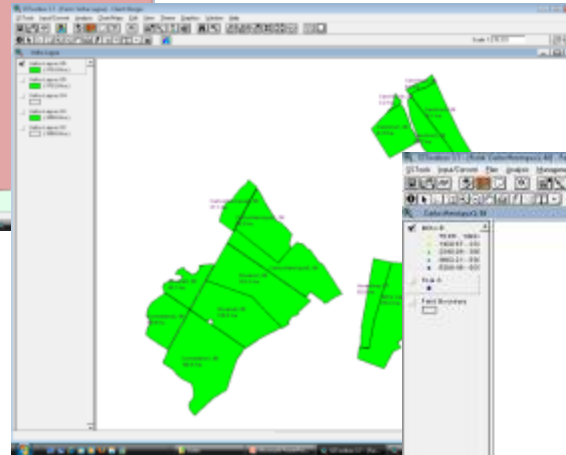
# Organização hierárquica dos dados facilita a geração de informação para o gerenciamento



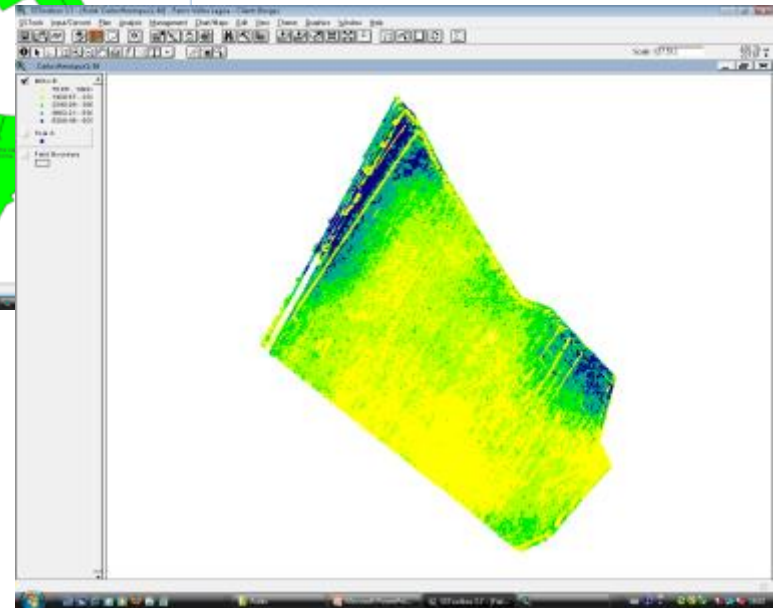
*País*



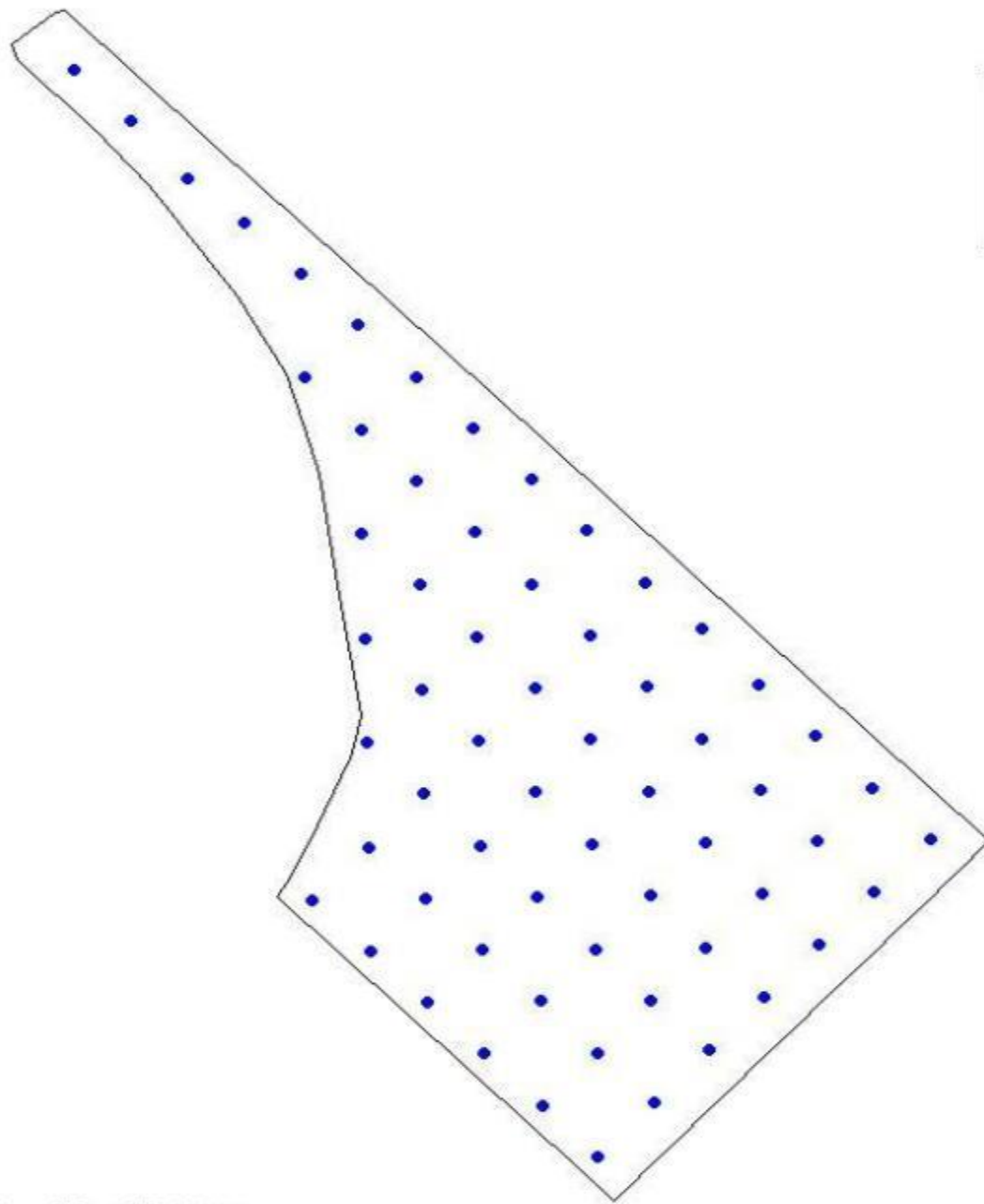
*Cliente*





*Fazenda*



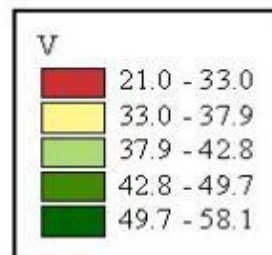
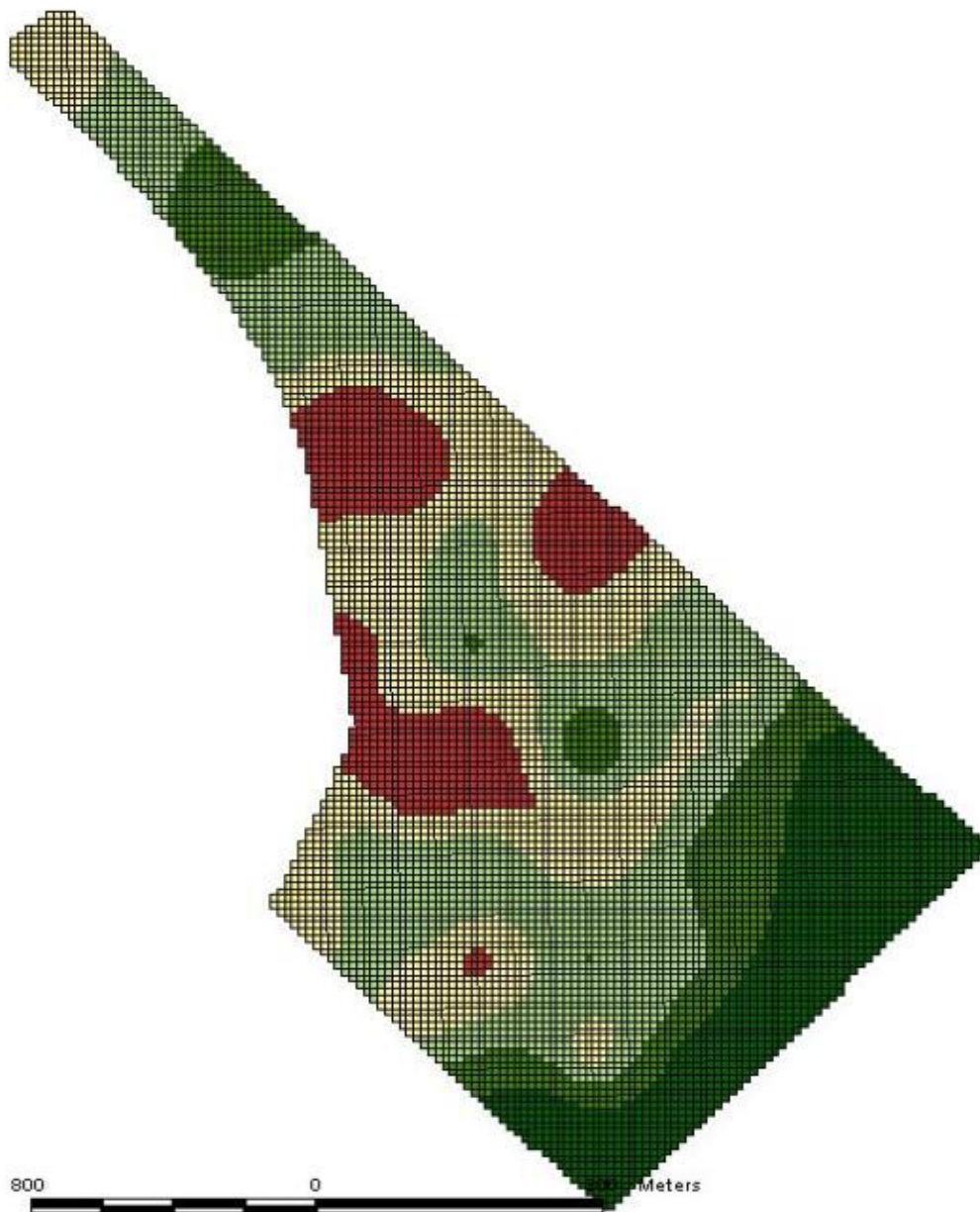
*Talhão*



 (302.2ha.)Field Boundary

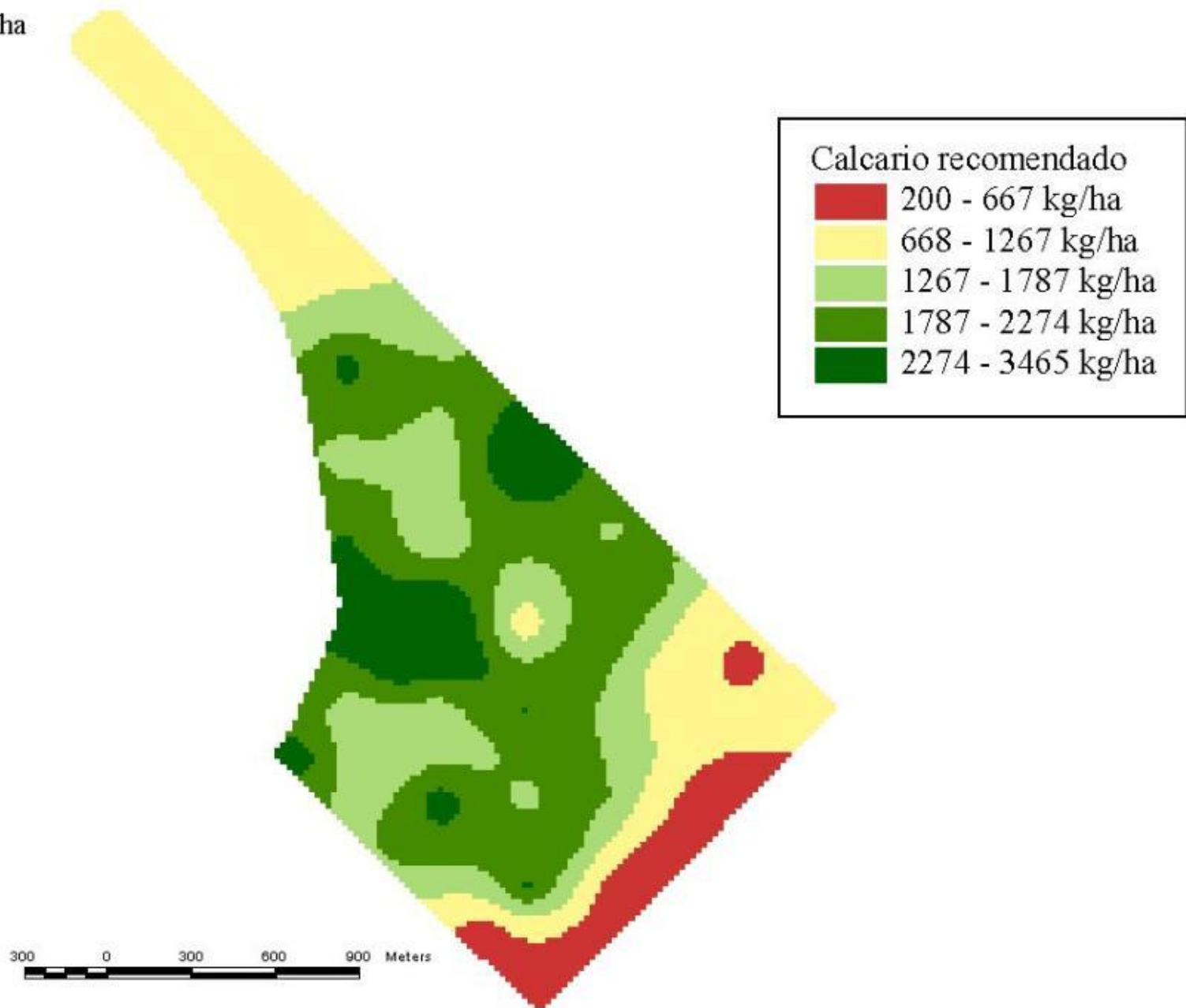
 Pontos



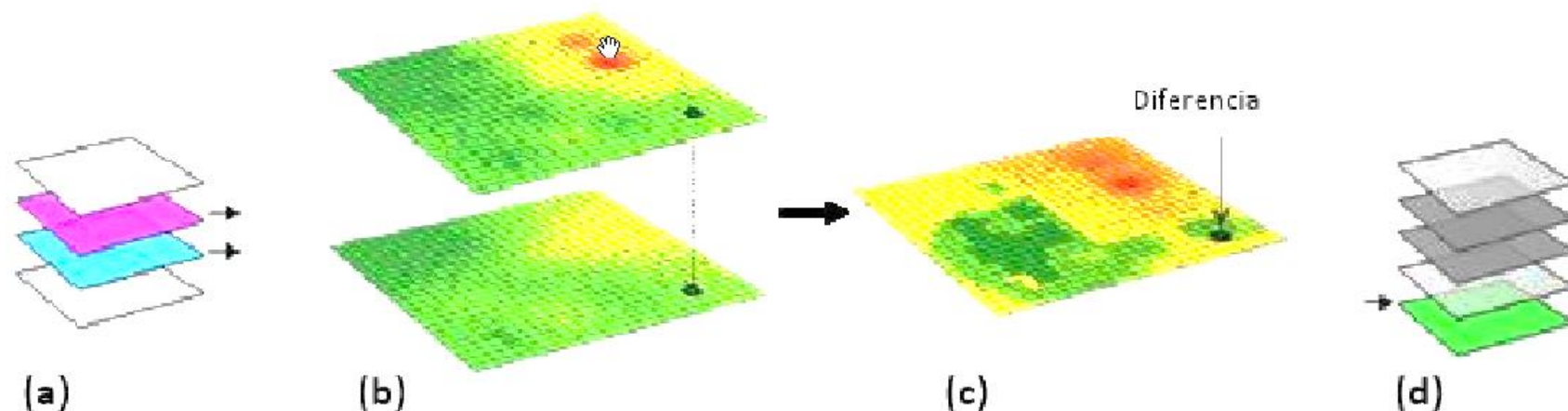




Alhao 302.2 ha



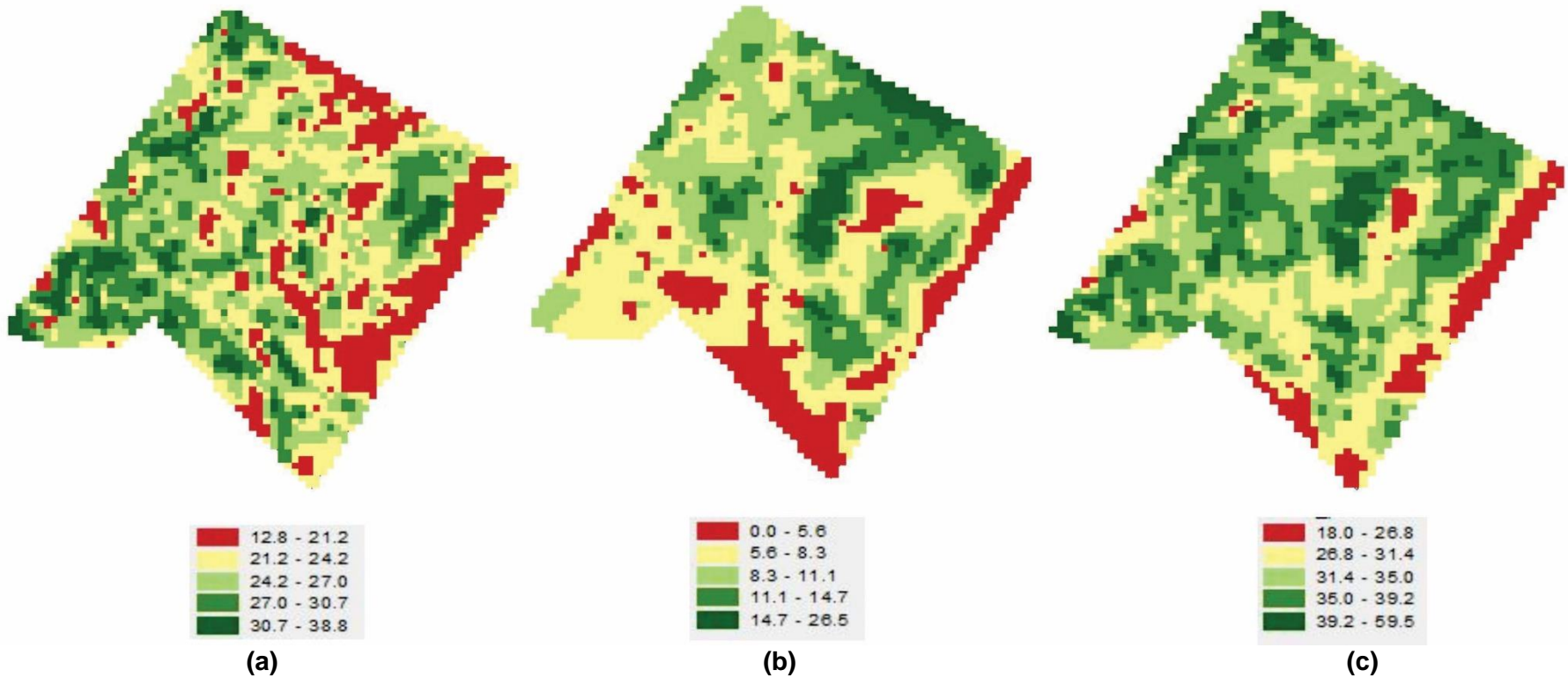
# Álgebra de mapas



Os dados (mapas) são adquiridos da base de dados (a); dois temas no formato raster são usados (b) para gerar um terceiro tema (mapa) por álgebra (c) e o novo tema (mapa) é armazenado na base de dados (d)

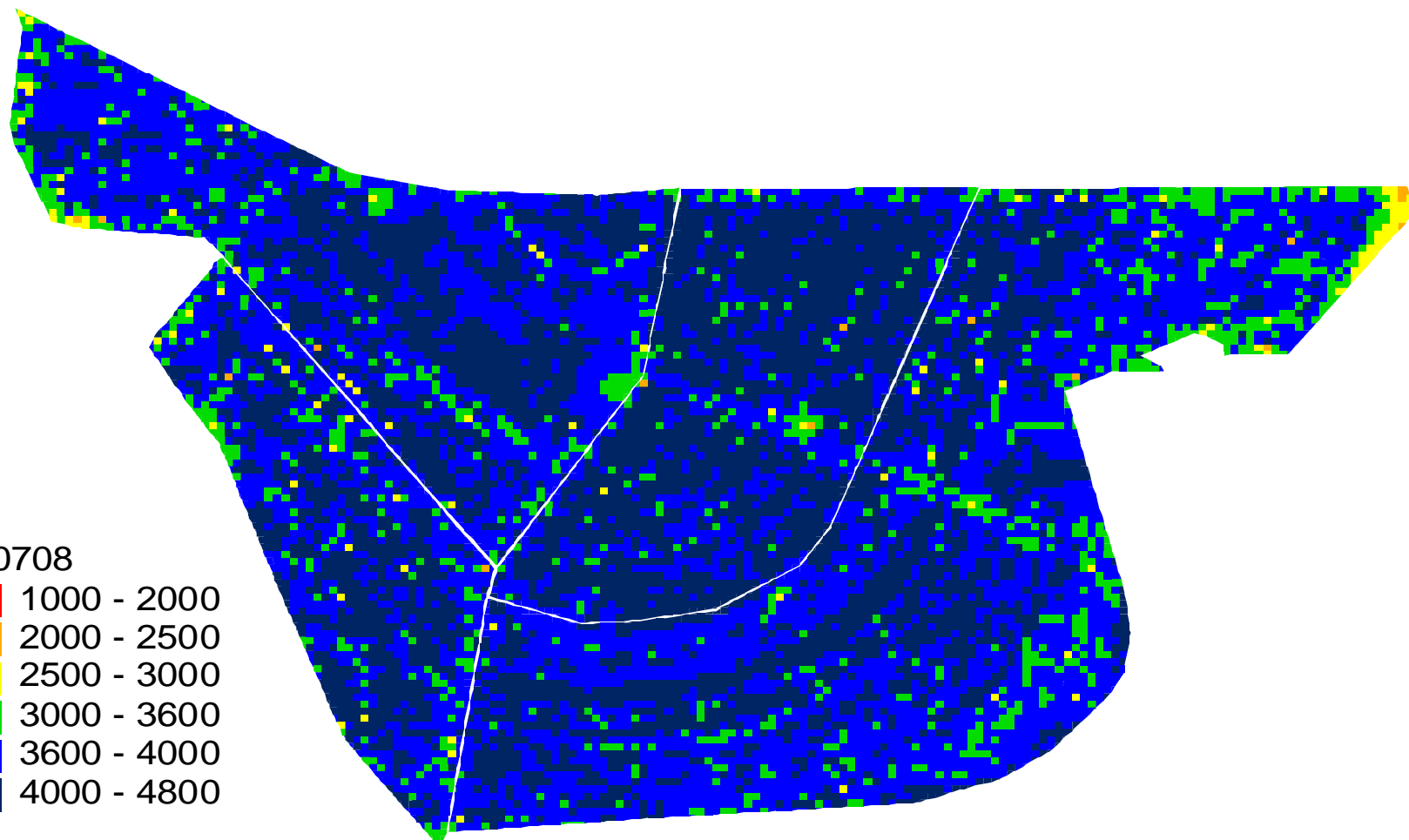
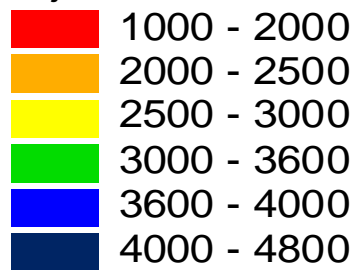
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**Mapas de colheita de laranja com suas respectivas legendas: primeira colheita (a), segunda colheita (b) e da soma das colheitas (c)**



As planilhas permitem que o usuário efetue operações aritméticas no próprio SIG. Mantendo a coluna “Id”, que é a coluna de identificação dos pixels, pode-se adicionar novas colunas nessa tabela, como por exemplo as produtividades de outros mapas. Após adicionar a produtividade de outro mapa, pode-se fazer as somas das produtividades.

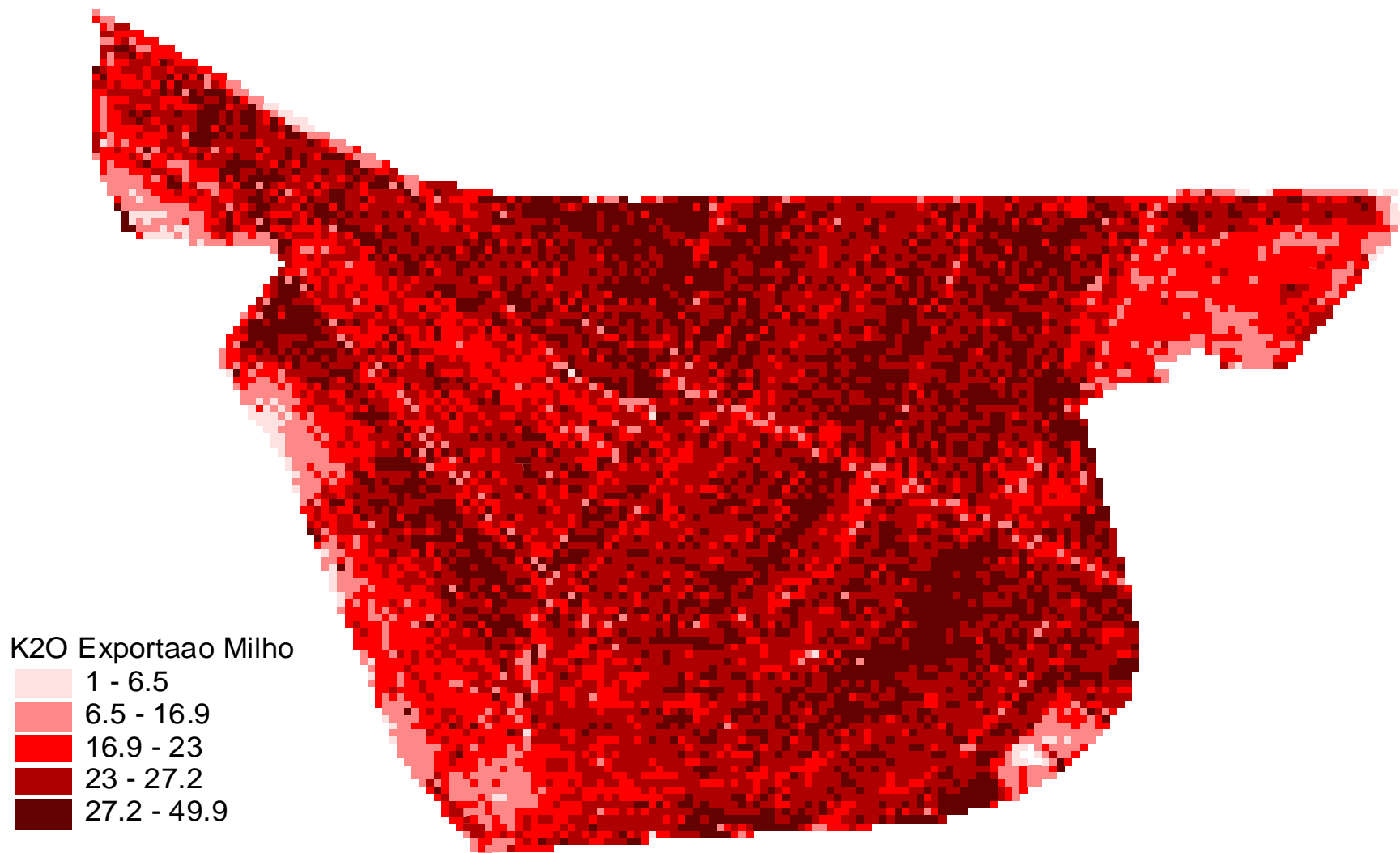
soja0708

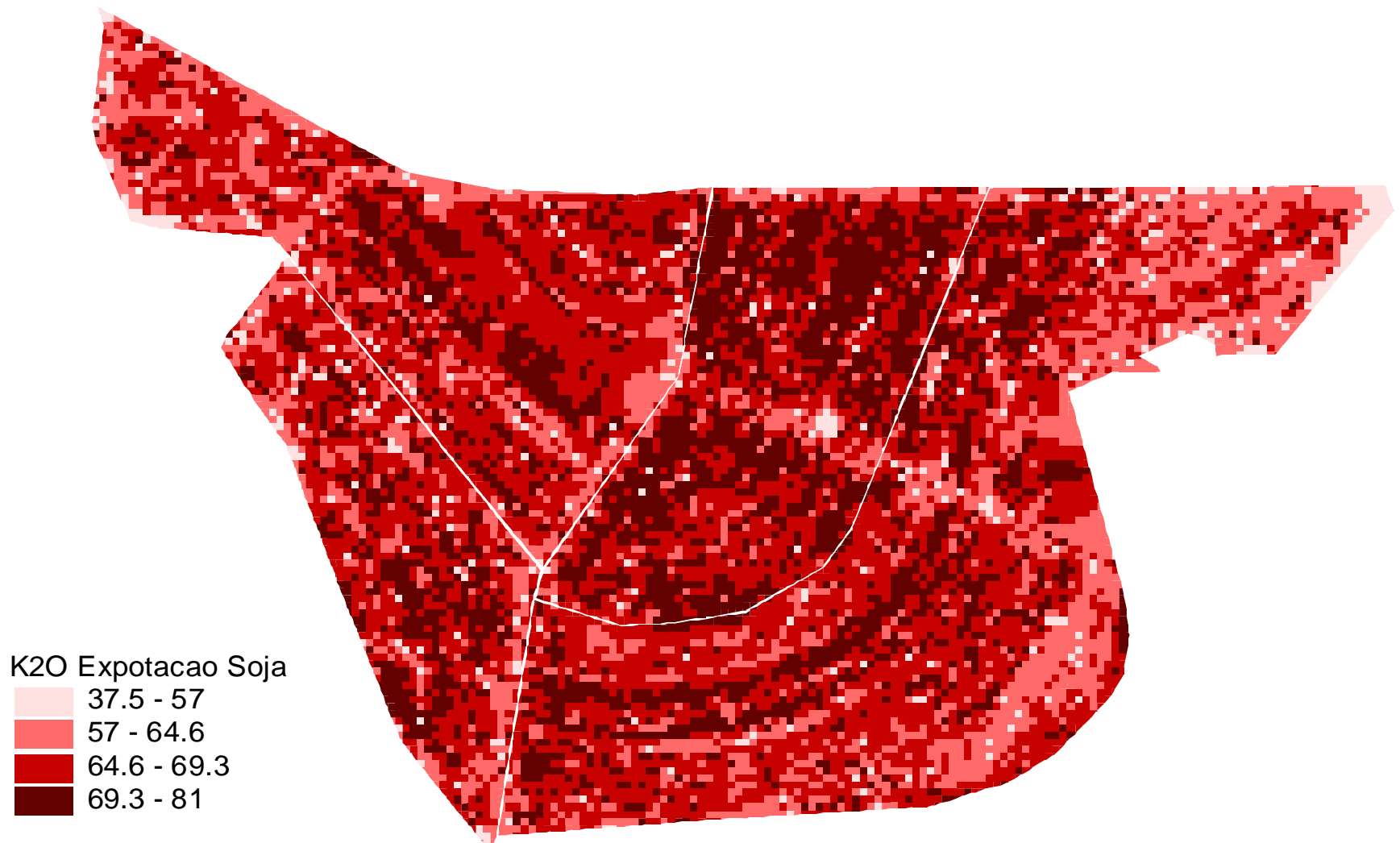


$$(6621 \text{ kg/ha} \times 5 \text{ kg})/1000 = 33,1 \text{ kg/ha (K}_2\text{O)}$$









# Recomendação para aplicação de KCl com base na exportação do milho e da soja

Total : 39408.88 Kg.

