1. Introduction

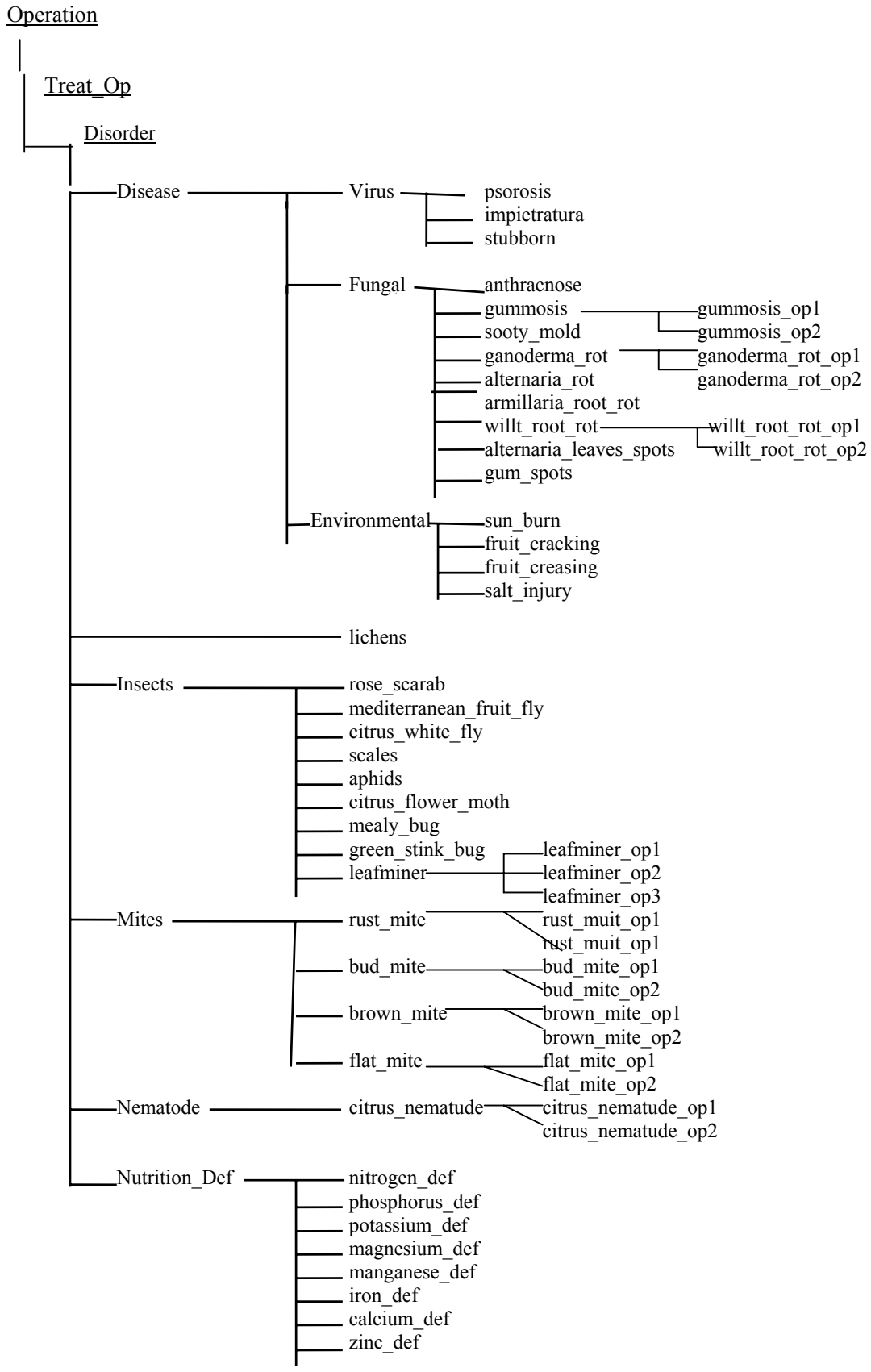
This report including the integration .of the two sub expert systems in CITEX4 diagnosis and treatment and also the database for CITEX4. the separate designs for each one of them has been published under the following technical report numbers: TR/CLAES/70/99.4, TR/CLAES/77/99.7, and TR/CLAES/56/99.2 respectively. There are two other amendments reports for both diagnosis and treatment sub systems: TR/CLAES/73/99.5 and TR/CLAES/110/2000.2 respectively. The comments in the reviewing reports for each sub system in the corresponding technical reports: TR/CLAES/152/2000.8, TR/CLAES/172/2000.11, and TR/CLAES/166/2000.10 respectively are considered.

2. Common Knowledge Base

2.1 Relation between Concepts

Variety

- Navel
- Succar
- Valencia
- Lime



Notes: 1) The black_root_rot and brown_rot concepts are removed from the disorder concept

2) The leaf part with the extension _op? are added dew to the implementation.

2.2 Concepts properties

Concept	Property	Facets	
Plantation	Plantation_Date	V.S.	DB
		V.T.	Date
		S/M.	S
		P.V.	date
	Current_Date	V.S.	Derived
		V.T.	Date
		S/M.	S
		P.V.	System Date
	existence	V.S.	Derived
		V.T.	nominal
		S/M.	S
		P.V.	Yes, no
Soil	pH	V.S.	DB
		V.T.	Real
		S/M.	S
		P.V.	0.1..14.0
	Ca_Carbonate	V.S.	DB
		V.T.	Real
		S/M.	S
		P.V.	0.1..14.0
	Water_Table_Level	V.S.	DB
		V.T.	Real
		S/M.	S
		P.V.	0.1..14.0
	Ec	V.S.	DB
		V.T.	Real
		S/M.	S
		P.V.	0.1..14.0
water	ECiw	V.S	DB
		V.T.	Real
		S/M.	S
		P.V.	0.01 : 5
Variety	value	V.S.	DB
		V.T.	nominal
		S/M.	S
		P.V.	Navel, Succar, Valencia, Lime
Disorder	Suspected	V.S.	User / Derived
		V.T.	nominal
		S/M.	M
		prompt	Select one or more disorders from the following list:
		P.V.	all disorders
	Confirmed	V.S.	Derived
		V.T.	nominal

Concept	Property	Facets	
		S/M.	S
		P.V.	all disorders
	Highly Confirmed	V.S.	Derived
		V.T.	nominal
		S/M.	S
		P.V.	all disorders
	Nitrogen_Infestation	V.S.	User
		V.T.	nominal
		S/M.	S
		P.V.	low, very low
	Phosphorus_Infestation	V.S.	User
		V.T.	nominal
		S/M.	S
		P.V.	low, very low
	Potassium_Infestation	V.S.	User
		V.T.	nominal
		S/M.	S
		P.V.	low, very low
	iron_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the iron defection infestation
		P.V.	'most trees'
	manganese_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the manganese defection infestation
		P.V.	'most trees'
	zinc_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the zinc defection infestation
		P.V.	'most trees'
	nitrogen_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the nitrogen defection infestation
		P.V.	'most trees'
	calcium_def_sp,	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the calcium defection infestation

Concept	Property	Facets	
		P.V.	'most trees'
	salt_injury_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the salt_injury defection infestation
		P.V.	'most trees'
	magnesium_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the magnesium defection infestation
		P.V.	'most trees'
	potassium_def_sp	V.S.	User
		V.T.	nominal
		S/M.	S
		prompet	What is the spread range of the potassium defection infestation
		P.V.	'most trees'
Leaves	L_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the leaves color?
		P.V.	green, green network, light green, dark green, green to red, yellow, brown, black, purple, bronze
	L_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the leaves shape?
		P.V.	normal, curled, webbed, honey dew, cup shape, unsimilar blade halves, zigzag tunnels
	L_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the leaves status?
		P.V.	normal, drop, insect persent, small, wilted
	L_Type	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the age of the infected leaves?
		P.V.	new leaves, old leaves
	L_C_Position	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	Where is the position of the infestation on the leaves?

Concept	Property	Facets	
		P.V.	entire leaf, inverted V, lower surface, upper surface, outer edge, leaf base, leaf margin, veins, between veins, main veins, leaf tip
Leaf_Spots	Existence	V.S.	User
		V.T.	nominal
		S/M.	S
		prompt	Are there any spots on leaves?
		P.V.	yes, no
	L_S_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is color of the spots on leaves?
		P.V.	yellow, brown, dusty, silver, rust, black
	L_S_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is shape of the spots on leaves?
		P.V.	raised, sunken, necrotic, zigzag tunnels, concentric zones
	L_S_Position	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is position of the spots on leaves?
		P.V.	scattered, upper surface, lower surface, between veins, between veins of lower surface, midrib upper surface
Fruits	F_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the fruits color?
		P.V.	normal, green, yellow, black, rust, purple, yellow styler end, green styler end
	F_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the fruits shape?
		P.V.	normal, soft, cracks, asymatric, small, malformed
	F_R_status	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the fruits status?
		P.V.	normal, rough, leathery, thickened, thin, reduced, creasing, rough and thickened, irregular
	F_C_position	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the position of the infestation on

Concept	Property	Facets	
			the fruit?
		P.V.	entire fruit, styler end
Fruit_spots	Existence	V.S.	User
		V.T.	nominal
		S/M.	S
		prompt	Are there spots on fruit?
		P.V.	yes, no
	F_S_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the color of the spots on the fruit?
		P.V.	green, yellow, brown, red, silver, bronze, scabby patches
	F_S_Position	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the position of the spots on the fruit?
		P.V.	scattered, any position, rind, stiller & stem ends, fruits facing the sun
	F_S_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the shape of the spots on the fruit?
		P.V.	circular, irregular, raised, coarse, large and circular, gum pocket, zigzag tunnels
Flowers	Fl_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the flowers color?
		P.V.	normal, brown, yellow
	Fl_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the flowers status?
		P.V.	normal, drop
	Fl_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the flowers shape?
		P.V.	normal, aggregated, eaten
Branches	B_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the branches color?
		P.V.	normal, brown, black, rust, pale, spotted yellowish
	B_Status	V.S.	User
		V.T.	nominal

Concept	Property	Facets	
		S/M.	M
		prompt	What is the branches status?
		P.V.	normal, stunted, flattened, thickened, dry, die back, insect present, gray fellvet, decline
	B_Type	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the age of the infected branches?
		P.V.	flushes, old growths
Trunk	T_Shape	V.S.	User
		V.T.	nominal
		S/M.	S
		prompt	What is the trunk shape?
		P.V.	normal, fungal growths, lichen growths, bark scaling, gum spots, dwarfing
	T_Position	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the trunk position?
		P.V.	Basal part, feeder roots
Buds	U_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the buds color?
		P.V.	normal, brown
	U_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the buds shape?
		P.V.	rosette, deformed
	U_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		prompt	What is the buds status?
		P.V.	normal, abnormal
Roots	R_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the root color?
		P.V.	normal, brown, black
	R_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the root status?
		P.V.	normal, fungal growths, sloughing, necrotic, adhesive
	R_Type	V.S.	User
		V.T.	nominal
		S/M.	M

Concept	Property	Facets	
		Prompt	What is the type of the infected roots?
		P.V.	main roots, feeder roots
Twigs	Tw_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the twigs color?
		P.V.	brown, rust
	Tw_Shape	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the twigs shape?
		P.V.	eaten
	Tw_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the twigs status?
		P.V.	dieback
Insects	I_Color	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the insects color?
		P.V.	green, black, white, red, purple
	I_Status	V.S.	User
		V.T.	nominal
		S/M.	M
		Prompt	What is the insects status?
		P.V.	stationary, flying, stucked, aggregated
Plant	Age	V.S.	**Derived**
		V.T.	Real
		S/M.	S
		P.V.	0 : 50
	Current_Month	V.S.	Derived
		V.T.	Integer
		S/M.	S
		P.V.	1 : 12
	Season	V.S.	Derived
		V.T.	Nominal
		S/M.	S
		P.V.	spring, summer, autumn, winter
	Current_week	V.S.	Derived
		V.T.	Integer
		S/M.	S
		P.V.	>=1 <= 52
Operation	Material_Name	V.S.	Derived
		V.T.	Nominal
		S/M.	M
		P.V.	all materials
	Material_Qty	V.S.	Derived
		V.T.	Real
		S/M.	S

Concept	Property	Facets	
		P.V.	> 0.0
	Method	V.S.	Derived
		V.T.	Nominal
		S/M.	S
		P.V.	painting, disinfection, soil_treatment, foliage nutrition, chemical spray, advice
	Unit	V.S.	Derived
		V.T.	String
		S/M.	S
		P.V.	text
	material_gr1	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'K.Z. 95%', ' Kimisol 95%',' super masrona 94%',' super royal 95%'
	material_gr2	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'actellic 50%', aikaten, ' anthio 33%', 'super aside'
	material_gr3	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'caprimex 98%', 'copox 50%', copper_oxychloride, 'cuprus K.Z 50%', 'halomac 65', 'pory coper 50%', 'pro coper 50%'
	material_gr4	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'agro oil 80%', 'bolum oil 80%', 'focal oil 82%', 'masrona oil 80%', 'royal oil 80%'
	material_gr5	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'vertimec + K.Z oil 95%', 'vertimec + Kimisol oil 95%', 'vertimec + super masrona 94%', 'vertimec + super royal oil 95%'
	material_gr6	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'neron 50%', 'ortis 5% sc + kz oil', 'vertimec 1.8% + kz oil'
	material_gr7	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'ortis 5% sc + kz oil', pride, 'vertimec 1.8% + kz oil'

Concept	Property	Facets	
	material_gr8	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'furidan 10%', 'ragbi 10%', 'temic 15%'
	material_gr9	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	urea, 'ammonium nitrate'
	material_gr10	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	potassium_nitrate, potassium_sulfate
	material_gr11	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'calcium chloride', 'calcium nitrate'
	material_gr12	V.S.	user
		V.T.	Nominal
		S/M.	M
		P.V.	'ibacid 50% + bominal', 'malthion 57% + policure'
Treat_Op	Tool	V.S.	Derived
		V.T.	Nominal
		S/M.	M
		P.V.	manual, sprayer motor
	Date	V.S.	Derived
		V.T.	Date
		S/M.	S
		P.V.	date
	special_date	V.S.	Derived
		V.T.	string
		S/M.	S
		P.V.	text
	Application_Time	V.S.	Derived
		V.T.	Nominal
		S/M.	M
		P.V.	early morning or after noon, any suitable time
	Advice	V.S.	Derived
		V.T.	String
		S/M.	M
		P.V.	text
	Number	V.S.	Derived
		V.T.	Integer
		S/M.	S
		P.V.	> 0 , <= 50
farm_data	sid	V.S.	user
		V.T.	integer
		S/M.	M
		P.V.	1..10
	gid	V.S.	user

Concept	Property	Facets	
		V.T.	integer
		S/M.	S
		P.V.	1..1000
	did	V.S.	user
		V.T.	integer
		S/M.	S
		P.V.	1..1000
	fid	V.S.	user
		V.T.	integer
		S/M.	S
		P.V.	1..1000
	month	V.S.	user
		V.T.	integer
		S/M.	S
		P.V.	1..12

Notes:

- The Observation concept was removed.
- The concept Climate and farm_data are added.
- The properties iron_def_sp, manganese_def_sp, zinc_def_sp, nitrogen_def_sp, salt_injury_sp, magnesium_def_sp, calcium_def_sp, potassium_def_sp of concept disorder are added.
- The legal values 'silver' and 'coarse' are added to the properties f_color and f_shape respectively of concept fruit.
- The property name for concept variety is replaced by value.
- The concept farm_data has been added

3. Diagnosis subsystem

3.1 Relations between expressions

Disorder & Plant & Observation CONFIRM Disorder
The following rules are modified
The original version

disorder Plant Leaves	value Age L_Color P_Position	gummosis >= 5 yellow; light green main veins	gummosis	Confirmed	likely
Disorder Leaves	Value L_Color L_Shape L_C_Position	Citrus_white_fly Black honey dew upper surface	Citrus_white_fly	Confirmed	Likely

The modified version

disorder Plant Leaves	value Age L_Color P_Position	gummosis >= 5 yellow; light green main veins	gummosis	Confirmed	likely
Disorder Leaves	Value L_Color L_Shape L_C_Position	Citrus_white_fly Black honey dew upper surface	Citrus_white_fly	Confirmed	Likely

Disorder & Soil VERIFY Disorder

The following rules in the original design are modified as described below.

The original version:

LEFT HAND SIDE			RIGHT HAND SIDE		
Concept	Property	Value	Concept	Property	Value
iron_def Soil	Confirmed Spread_range pH Ca_carbonate	likely most trees < 8.5 < 10	iron_def	Confirmed	most likely
manganese_def Soil	Confirmed Spread_range pH Ca_carbonate	likely most trees < 8.5 < 10	manganese_def	Confirmed	most likely
zinc_def Soil	Confirmed Spread_range pH Ca_carbonate	likely most trees < 8.5 < 10	zinc_ def	Confirmed	most likely
Nitrogen_def Soil	Confirmed Spread_range Water_table_level	Likely most trees < 1.5	Nitrogen_def	Confirmed	most likely
Salt_injury Soil	Confirmed Spread_range Ec	likely most trees >=2	Salt_injury	Confirmed	most likely

The modified version:

iron_def Soil	Confirmed iron_def_sp pH Ca_carbonate	likely most trees < 8.5 < 10	iron_def	Confirmed	most likely
manganese_def Soil	Confirmed manganese_def _sp pH Ca_carbonate	likely most trees < 8.5 < 10	manganese_def	Confirmed	most likely
zinc_def Soil	Confirmed zinc_def _sp pH Ca_carbonate	likely most trees < 8.5 < 10	zinc_ def	Confirmed	most likely
Nitrogen_def Soil	Confirmed Nitrogen_def _sp Water_table_level	Likely most trees < 1.5	Nitrogen_def	Confirmed	most likely
Salt_injury	Confirmed Salt_injury _sp	likely most trees	Salt_injury	Confirmed	most likely

Soil	Ec	>=2			

Disorder & Water VERIFY Disorder

The following rules in the original design are modified as described below.

The original version:

LEFT HAND SIDE			RIGHT HAND SIDE		
Concept	Property	Value	Concept	Property	Value
Salt_injury	Confirmed	likely	Salt_injury	Confirmed	most likely
	Spread_range	most trees			
Water	Eciw	>= 1			

The modified version:

LEFT HAND SIDE			RIGHT HAND SIDE		
Concept	Property	Value	Concept	Property	Value
Salt_injury	Confirmed	likely	Salt_injury	Confirmed	most likely
	Spread_range	most trees			
Water	Eciw	>= 1			

Disorder & Soil & Water VERIFY Disorder

The following rules in the original design are modified as described below.

The original version:

LEFT HAND SIDE			RIGHT HAND SIDE		
Concept	Property	Value	Concept	Property	Value
magnesium_def	Confirmed	likely	magnesium_def	Confirmed	most likely
	Spread_range	most trees			
Water	Eciw	< 1			
Soil	Ec	< 2			
Calcium_def	Confirmed	likely	Calcium_def	Confirmed	most likely
	Spread_range	most trees			
Water	Eciw	< 1			
Soil	Ec	< 2			
Potassium_def	Confirmed	likely	Potassium_def	Confirmed	most likely
	Spread_range	most trees			
Water	Eciw	< 1			
Soil	Ec	< 2			

The modified version:

LEFT HAND SIDE			RIGHT HAND SIDE		
Concept	Property	Value	Concept	Property	Value
magnesium_def	Confirmed	likely	magnesium_def	Confirmed	most likely
	magnesium_def_sp	most trees			
Water	Eciw	< 1			
Soil	Ec	< 2			
Calcium_def	Confirmed	likely	Calcium_def	Confirmed	most likely
	Calcium_def _sp	most trees			
Water	Eciw	< 1			
Soil	Ec	< 2			
Potassium_def	Confirmed	likely	Potassium_def	Confirmed	most likely
	Potassium_def _sp	most trees			

Water Soil	Eciw Ec	< 1 < 2			

3.2 Inference layer

- The following dynamic roles added to the dynamic role table:

Dynamic Role	Domain primitives
Confirmed Disorder(s)	The confirmed disorders

- The following dynamic roles is deleted from the dynamic role table Possible Disorder

- The following inference steps are modified to:

Name	**PREDICT**
Function	The hypothesis disorder(s) are to be predicted using User complains and Case Description
Input	Complain, Case Description
Output	Hypothesis
Static Role	Observation CAUSED_BY Disorder Observation & Plant CAUSED_BY Disorder Observation & Variety CAUSED_BY Disorder Observation & Variety & Plant CAUSED_BY Disorder
Method	Use the CAUSED_BY relation
Name	**VERIFY**
Function	The confirmation of the disorder is to verified using the case of system description and the confirmed disorder(s)
Input	Confirmed Disorder(s, System Description, Case description
Output	Diagnostic Disorder(s)
Static Role	Disorder & Observation & Plant VERIFY Disorder Disorder & Observation & Variety VERIFY Disorder Disorder & Observation & Plant & Variety VERIFY Disorder Disorder & Observation VERIFY Disorder Disorder & Water VERIFY Disorder Disorder & Soil VERIFY Disorder Disorder & Soil & Water VERIFY Disorder Plant VERIFY Disorder Disorder VERIFY Disorder
Method	Use the VERIFY relations

- The following inference step are replaced by a procedure in the interface:-

  Generate complain

  Generate Confirmed observation

Generate High Confirmed observation

3.3 Task layer

```
Task Layer Disorder Diagnosis
 Goal finding causes of user complains or verifying the user assumption

Obtain from DB (Plantation_Date)
Obtain from system (Plantation.Current_Date)
If (Plantation_Date <= Plantation.Current_Date) Then Plantation.Existance = "Yes"
                                                    Else Plantation.Existance = "No"
Plant.Age = (Plantation_Date - Plantation.Current_Date)

If (Plantation.Existance = "Yes")
{
        DETERMINE (System Description ------> Case Description)
        Present citex diagnosis Screen
         IF button1 selected THEN
                Generate complain
                Update concept list in citex diagnosis Screen
         ENDIF
         IF Susbutton selected THEN
                PREDICT (Complain----------------> Suspected Disorders)
                Update suspected disorders list in citex diagnosis Screen
                Generate confirmed observation
                Update concept list in citex diagnosis Screen
         ENDIF
         IF Conbutton selected THEN
                CONFIRM (Suspected Disorders + Case Description + Confirmed
         Observation  -----------> Confirmed Disorder)
                Update confirmed disorders list in citex diagnosis Screen
                Generate Highly Confirmed observation
                Update concept list in citex diagnosis Screen
         ENDIF
         IF HiConbutton selected THEN
                VERIFY (Confirmed Disorder + System Description + Case Description
                                            ----------->Diagnostic Disorder(s))
                Update higy confirmed disorders list in citex diagnosis Screen
         ENDIF
}
Else
        Present Message ("There is no Plantation exists to be diagnose")
Endif
```

4. Treatment subsystem

4.1. Relations between expressions

Disorder & Variety & Plant TREATED_BY Treat_Op

The following rules in the original design are modified as described below.

The original version:

Disorder valancia Plant	Confirmed Highly Confirmed Current_Month	mediterranean_ fruit_fly 4	mediterran ean_fruit_ fly	Material_Name Method Date Number	{malthion 57%+ policure; libacid 50%+ bominal } chemical spray current date 1
Disorder # valancia Plant	Confirmed Highly Confirmed Current_Month	mediterranean_ fruit_fly 9			
Disorder valancia Plant	Confirmed Highly Confirmed Current_Month	mediterranean_ fruit_fly # 4	mediterran ean_fruit_ fly	Material_Name Method Date Number	none advice current date 1
Disorder # valancia Plant	Confirmed	mediterranean_ fruit_fly # 9	mediterran ean_fruit_ fly	Material_Name Method Date Number	none advice current date 1
Disorder valancia Plant	Confirmed Highly Confirmed Current_Month	mediterranean_ fruit_fly 4	mediterran ean_fruit_ fly	Material_Name	material_gr12
Disorder # valancia Plant	Confirmed Highly Confirmed Current_Month	mediterranean_ fruit_fly 9	mediterran ean_fruit_ fly	Method Date Number	chemical spray current date 1

The modified version:

Disorder Variety Plant	Confirmed Highly Confirmed Value Current_Month	mediterranean_ fruit_fly valancia 4	mediterran ean_fruit_ fly	Material_Name Method Date Number	{malthion 57%+ policure; libacid 50%+ bominal } chemical spray current date 1
Disorder Variety Plant	Confirmed Highly Confirmed Value Current_Month	mediterranean_ fruit_fly # valancia 9			
Disorder Variety Plant	Confirmed Highly Confirmed Value Current_Month	mediterranean_ fruit_fly valancia # 4	mediterran ean_fruit_ fly	Material_Name Method Date Number	none advice current date 1
Disorder Variety Plant	Confirmed Value Current_Month	mediterranean_ fruit_fly # valancia # 9	mediterran ean_fruit_ fly	Material_Name Method Date Number	none advice current date 1
Disorder	Confirmed			Material_Name	

Variety Plant	Highly Confirmed Value Current_Month	mediterranean_ fruit_fly valancia 4	mediterran ean_fruit_ fly		material_gr12
Disorder Variety Plant	Confirmed Highly Confirmed Value Current_Month	mediterranean_ fruit_fly # valancia 9	mediterran ean_fruit_ fly	Method Date Number	chemical spray current date 1

Treat_Op & Plant ENHANCED_BY Treat_Op

The following rules in the original design are modified as described below.

The original version:

manganise_def Plant	Method Season	Advice Spring	manganis e_def	Advice	No foliage application during the flowering stage and fruit setting
manganise_def Plant	Method Season	manganise_def autumn; winter	manganis e_def	Advice	No foliage application during the fruits collecting period.

The modified version:

manganese_def Plant	Method Season	Advice Spring	manganis e_def	Advice	No foliage application during the flowering stage and fruit setting
manganese_def Plant	Method Season	manganise_def autumn; winter	manganis e_def	Advice	No foliage application during the fruits collecting period.

Disorder & Plant TREATED_BY Treat_Op

The following rules in the original design are modified as described below.

The original version:

Disorder Plant	Confirmed Highly Confirmed Current_Month	citrus_nematu de 2;3	citrus_nematu de	Material_Name Method Date Number	material_gr8 soil_treatment current date 1
			Citrus_nemat ude_op1 Citrus_nemat ude_op2	Material_Name Method Date Number Material_Name Method Date Number	vaydete soil_treatment current date 1 vaydete soil_treatment current date + 21 2
Disorder Plant	Confirmed Highly Confirmed Current_Month	citrus_nematu de # 2;3	citrus_nematu de	Material_Name Method Date Number	material_gr8 soil_treatment next 1/2 1
			citrus_nematu de_op1 citrus_nematu de_op2	Material_Name Method Date Number Material_Name Method Date	vaydete soil_treatment next 1/2 1 vaydete soil_treatment next 22/2

				Number	2
magnesium_def Plant	Method Season	Advice Spring	magnesium_def	Advice	No foliage application during the flowering stage and fruit setting
Disorder Plant	Confirmed Highly Confirmed Current_Month	citrus_nematude # 2;3		Material_Name Method Date Number	citrus_nematude { temic 15%; furidan 10%; ragbi 10%} soil_treatment next 1/2 1
			citrus_nematude	Material_Name Method Date Number Material_Name Method Date Number	vaydete soil_treatment next 1/2 1 vaydete soil_treatment next 22/2 2
Disorder Plant	Confirmed Highly Confirmed Current_Month	zinc_def summer	zinc_def	Material_Name Method Date Number	micro element mixture foliage nutrition current date 1
Disorder Plant	Confirmed Highly Confirmed Season	nitrogen_ def # winter	nitrogen_def	Material_Name Method Date Number	{urea; ammonium nitrate} foliage nutrition current date 1
Disorder Plant	Confirmed Season	potassium_def # winter	potassium_def	Material_Name Method Date Number	{potassium_sulfate ; potassium_nitrate} foliage nutrition current date 1

The modified version:

Disorder Plant	Confirmed Highly Confirmed Current_Month	citrus_nematude 2;3	Citrus_nematude_op1 Citrus_nematude_op2	Material_Name Method Date Number Material_Name Method Date Number	material_gr8 soil_treatment current date 1 material_gr8 soil_treatment current date 2
			Citrus_nematude_op1 Citrus_nematude_op2	Material_Name Method Date Number Material_Name Method Date Number	vaydete soil_treatment current date 1 vaydete soil_treatment current date + 21 2
Disorder	Confirmed	citrus_nematude			

Plant	Highly Confirmed Current_Month	# 2;3	Citrus_nematude_op1 Citrus_nematude_op2	Material_Name Method Date Number Material_Name Method Date Number	material_gr8 soil_treatment next 1/2 1 material_gr8 soil_treatment next 1/2 1
			citrus_nematude_op1 citrus_nematude_op2	Material_Name Method Date Number Material_Name Method Date Number	vaydete soil_treatment next 1/2 1 vaydete soil_treatment next 22/2 2
magneseum_def Plant	Method Season	Advice Spring	magneseum_def	Advice	No foliage application during the flowering stage and fruit setting
Disorder Plant	Confirmed Highly Confirmed Current_Month	citrus_nematude # 2;3	citrus_nematude	Material_Name Method Date Number	{ temic 15%; furidan 10%; ragbi 10%} soil_treatment next 1/2 1
			citrus_nematude	Material_Name Method Date Number Material_Name Method Date Number	vaydete soil_treatment next 1/2 1 vaydete soil_treatment next 22/2 2
Disorder Plant	Confirmed Highly Confirmed season	zinc_def summer	zinc_def	Material_Name Method Date Number	micro element mixture foliage nutrition current date 1
Disorder Plant	Confirmed Highly Confirmed Season	nitrogen_ def # winter	nitrogen_def	Material_Name Method Date Number	material_gr9 foliage nutrition current date 1
Disorder Plant	Confirmed Highly Confirmed Season	potassium_def # winter	potassium_def	Material_Name Method Date Number	material_gr10 foliage nutrition current date 1

Disorder TREATED_BY Treat_Op

The following rules in the original design are modified as described below.

The original version:

Disorder	Confirmed	wilt_root_rot	wilt_root_rot_op1	Material_Name	topsin

	Higly confirmed		wilt_root_rot_op1	Method Date Number Material_Name Method Date Number	soil_treatment current date 1 topsin soil_treatment current date + 21 days 2

The modified version:

Disorder	Confirmed	wilt_root_rot	wilt_root_rot_op1	Material_Name Method Date Number	topsin soil_treatment current date 1
	Higly confirmed		wilt_root_rot_op2	Material_Name Method Date Number	topsin soil_treatment current date + 21 days 2

Treat_Op DETERMINE Treat_Op

The following rules in the original design are modified as described below.

The original version:

gummosis	Material_Name	potasiam_permen ganat	gummosis	Material_Qty Unit	10 gm/1 l water
	Material_Name	bordeaux_past		Material_Qty Unit	1 kg $CuSo_4$ +2kg CaO +10 L water
leafminer	Material_Name	vertimec + super misrona 94%	leafminer	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer	Material_Name	vertimec + super royal 95%	leafminer	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer	Material_Name	vertimec + K.Z 95%	leafminer	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer	Material_Name	vertimec + kimisol 95%	leafminer	Material_Qty Unit	25 ml + 25 ml/100 l water
wilt_root_rot	Material_Name	topsin	wilt_root_ rot	Material_Qty Unit	20 gm/tree
flat_mite	Material_Name	ortis 5% sc + kz oil	flat_mite	Material_Qty Unit	50 ml + 150 ml/100 l water
brown_mite	Material_Name	ortis 5% sc + kz oil	brown_mi te	Material_Qty Unit	50 ml + 150 ml/100 l water
rust_mite	Material_Name	ortis 5% sc + kz oil	rust_mite	Material_Qty Unit	100 ml + 150 ml/100 l water
bud_mite	Material_Name	ortis 5% sc + kz oil	bud_mite	Material_Qty Unit	100 ml + 150 ml/100 l water
rust_mite	Material_Name	neron 50%	rust_mite	Material_Qty	40

				Unit	ml /100 l water
bud_mite	Material_Name	neron 50%	bud_mite	Material_Qty Unit	40 ml /100 l water
rust_mite	Material_Name	vertimec 1.8% + kz oil	rust_mite	Material_Qty Unit	30 ml+ 250 ml/100 L water
bud_mite	Material_Name	vertimec 1.8% + kz oil	bud_mite	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite	Material_Name	vertimec 1.8% + kz oil	flat_mite	Material_Qty Unit	30 ml+ 250 ml/100 L water
brown_mite	Material_Name	vertimec 1.8% + kz oil	brown_mite	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite	Material_Name	pride	flat_mite	Material_Qty Unit	100 ml/100 l water
brown_mite	Material_Name	pride	brown_mite	Material_Qty Unit	100 ml/100 l water
citrus_nematude	Material_Name	temic 15%	citrus_nematude	Material_Qty Unit	17 kg /feddan
citrus_nematude	Material_Name	furidan 10%	citrus_nematude	Material_Qty Unit	40 kg /feddan
citrus_nematude	Material_Name	ragbi 10%	citrus_nematude	Material_Qty Unit	24 kg /feddan
citrus_nematude	Material_Name	vaydete	citrus_nematude	Material_Qty Unit	4 L/feddan

The modified version:

gummosis	Material_Name	potasiam_permenganat	gummosis	Material_Qty Unit	10 gm/1 l water
gummosis	Material_Name	bordeaux_past	gummosis	Material_Qty Unit	1 kg $CuSo_4$ +2kg CaO +10 L water
leafminer_op1	Material_Name	vertimec + super misrona 94%	leafminer_op1	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op1	Material_Name	vertimec + super royal 95%	leafminer_op1	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op1	Material_Name	vertimec + K.Z 95%	leafminer_op1	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op1	Material_Name	vertimec + kimisol 95%	leafminer_op1	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op2	Material_Name	vertimec + super misrona 94%	leafminer_op2	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op2	Material_Name	vertimec + super royal 95%	leafminer_op2	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op2	Material_Name	vertimec + K.Z 95%	leafminer_op2	Material_Qty Unit	25 ml + 25 ml/100 l

					water
leafminer_op2	Material_Name	vertimec + kimisol 95%	leafminer_op2	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op3	Material_Name	vertimec + super misrona 94%	leafminer_op3	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op3	Material_Name	vertimec + super royal 95%	leafminer_op3	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op3	Material_Name	vertimec + K.Z 95%	leafminer_op3	Material_Qty Unit	25 ml + 25 ml/100 l water
leafminer_op3	Material_Name	vertimec + kimisol 95%	leafminer_op3	Material_Qty Unit	25 ml + 25 ml/100 l water
wilt_root_rot_op1	Material_Name	topsin	wilt_root_rot_op1	Material_Qty Unit	20 gm/tree
wilt_root_rot_op2	Material_Name	topsin	wilt_root_rot_op2	Material_Qty Unit	20 gm/tree
flat_mite_op1	Material_Name	ortis 5% sc + kz oil	flat_mite_op1	Material_Qty Unit	50 ml + 150 ml/100 l water
flat_mite_op2	Material_Name	ortis 5% sc + kz oil	flat_mite_op2	Material_Qty Unit	50 ml + 150 ml/100 l water
brown_mite_op1	Material_Name	ortis 5% sc + kz oil	brown_mite_op1	Material_Qty Unit	50 ml + 150 ml/100 l water
rust_mite_op1	Material_Name	ortis 5% sc + kz oil	rust_mite_op1	Material_Qty Unit	100 ml + 150 ml/100 l water
bud_mite_op1	Material_Name	ortis 5% sc + kz oil	bud_mite_op1	Material_Qty Unit	100 ml + 150 ml/100 l water
rust_mite_op1	Material_Name	neron 50%	rust_mite_op1	Material_Qty Unit	40 ml /100 l water
bud_mite_op1	Material_Name	neron 50%	bud_mite_op1	Material_Qty Unit	40 ml /100 l water
rust_mite_op1	Material_Name	vertimec 1.8% + kz oil	rust_mite_op1	Material_Qty Unit	30 ml+ 250 ml/100 L water
bud_mite_op1	Material_Name	vertimec 1.8% + kz oil	bud_mite_op1	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite_op1	Material_Name	vertimec 1.8% + kz oil	flat_mite_op1	Material_Qty Unit	30 ml+ 250 ml/100 L water
brown_mite_op1	Material_Name	vertimec 1.8% + kz oil	brown_mite_op1	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite_op1	Material_Name	pride	flat_mite_op1	Material_Qty Unit	100 ml/100 l water
brown_mite_op1	Material_Name	pride	brown_mite_op1	Material_Qty Unit	100 ml/100 l water
citrus_nematude	Material_Name	temic 15%	citrus_ne	Material_Qty	17

_op1			matude_op1	Unit	kg /feddan
citrus_nematude_op1	Material_Name	furidan 10%	citrus_nematude_op1	Material_Qty Unit	40 kg /feddan
citrus_nematude_op1	Material_Name	ragbi 10%	citrus_nematude_op1	Material_Qty Unit	24 kg /feddan
citrus_nematude_op1	Material_Name	vaydete	citrus_nematude_op1	Material_Qty Unit	4 L/feddan
brown_mite_op2	Material_Name	ortis 5% sc + kz oil	brown_mite_op2	Material_Qty Unit	50 ml + 150 ml/100 l water
rust_mite_op2	Material_Name	ortis 5% sc + kz oil	rust_mite_op2	Material_Qty Unit	100 ml + 150 ml/100 l water
bud_mite_op2	Material_Name	ortis 5% sc + kz oil	bud_mite_op2	Material_Qty Unit	100 ml + 150 ml/100 l water
rust_mite_op2	Material_Name	neron 50%	rust_mite_op2	Material_Qty Unit	40 ml /100 l water
bud_mite_op2	Material_Name	neron 50%	bud_mite_op2	Material_Qty Unit	40 ml /100 l water
rust_mite_op2	Material_Name	vertimec 1.8% + kz oil	rust_mite_op2	Material_Qty Unit	30 ml+ 250 ml/100 L water
bud_mite_op2	Material_Name	vertimec 1.8% + kz oil	bud_mite_op2	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite_op2	Material_Name	vertimec 1.8% + kz oil	flat_mite_op2	Material_Qty Unit	30 ml+ 250 ml/100 L water
brown_mite_op2	Material_Name	vertimec 1.8% + kz oil	brown_mite_op2	Material_Qty Unit	30 ml+ 250 ml/100 L water
flat_mite_op2	Material_Name	pride	flat_mite_op2	Material_Qty Unit	100 ml/100 l water
brown_mite_op2	Material_Name	pride	Brown_mite_op2	Material_Qty Unit	100 ml/100 l water
citrus_nematude_op2	Material_Name	temic 15%	citrus_nematude_op2	Material_Qty Unit	17 kg /feddan
citrus_nematude_op2	Material_Name	furidan 10%	citrus_nematude_op2	Material_Qty Unit	40 kg /feddan
citrus_nematude_op2	Material_Name	ragbi 10%	citrus_nematude_op2	Material_Qty Unit	24 kg /feddan
citrus_nematude_op2	Material_Name	vaydete	citrus_nematude_op2	Material_Qty Unit	4 L/feddan

Treat_Op ENHANCED_BY Treat_Op

The following rules in the original design are modified as described below.

The original version:

bud_mite Plant	Method Current_week	Chemical spray > 0 < 7; >22 < 35; > 44 <= 52	bud_mite	Advice	The treatment at this time is not recommended. Time of chemical control in late of February, in case of infestation.
brown_mite Plant	Method Season	Chemical spray # summer	brown_mite	Advice	The treatment at this time is not recommended. Time of chemical control in late of May, in case of infestation.
flat_mite Plant	Method Season	Chemical spray Summer	flat_mite	Advice	Spot spraying localized infestation is good practice and tractor drawn equipment with agitator is often the ideal machine for application. Spraying should be as a mist, tacking umbrella shape at lower pressure and as far as possible from downwards to up words and pointing to the core of tree.
flat_mite Plant	Method Season	chemical spray # summer	flat_mite	Advice	The treatment at this time is not recommended. Time of chemical control in late of April, in case of infestation.
citrus_nematude	method	soil treatment	citrus_nematude	Advice	You must follow this operation by light irrigation to avoid application of fruit bearing trees.

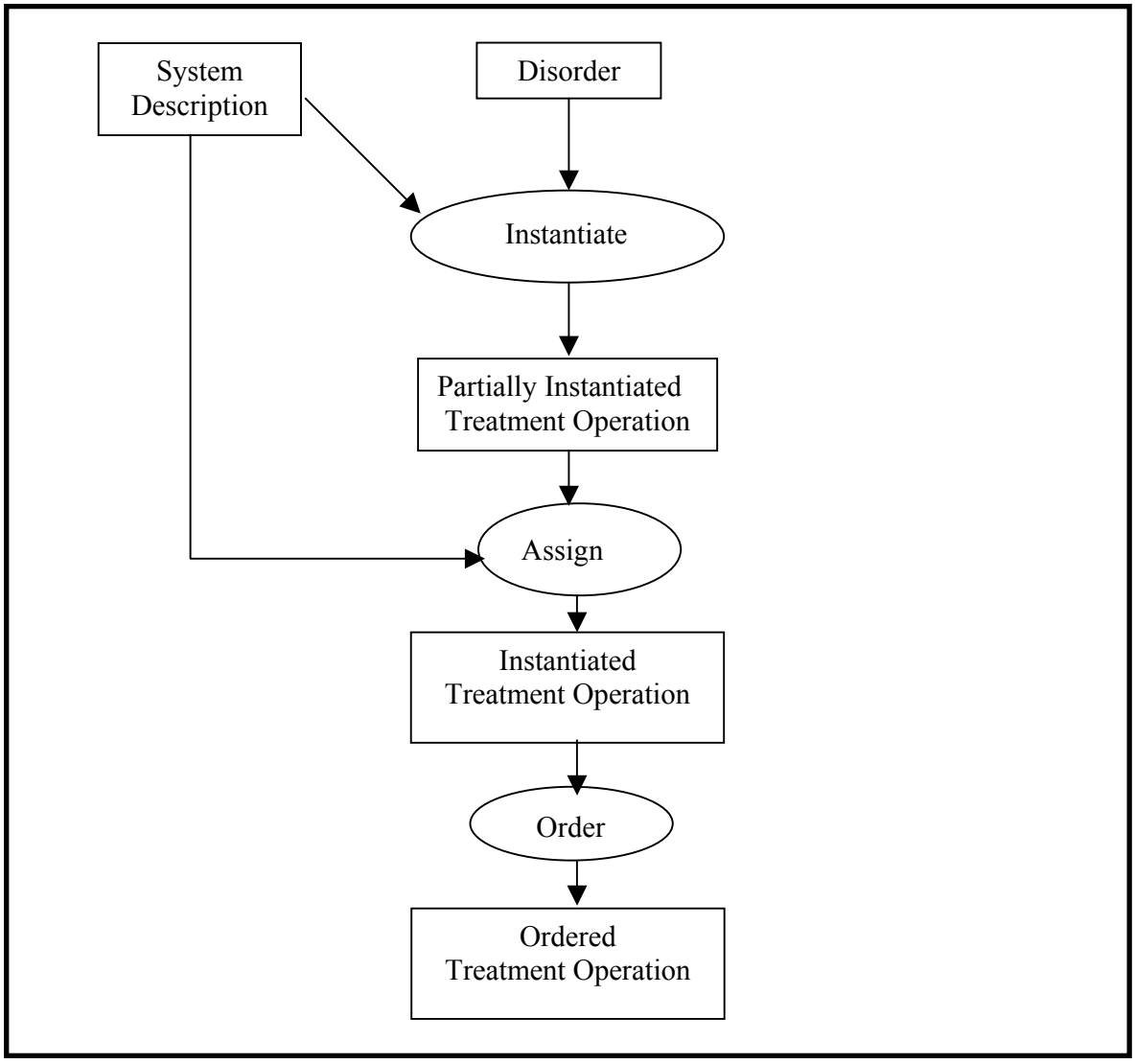
The modified version:

bud_mite_op1 Plant	Method Current_week	Chemical spray > 0 < 7; >22 < 35; > 44 <= 52	bud_mite_op1	Advice	The treatment at this time is not recommended. Time of chemical control in late of February, in case of infestation.
bud_mite_op1 Plant	Method Current_week	Chemical spray > 0 < 7; >22 < 35; > 44 <= 52	bud_mite_op1	Advice	The treatment at this time is not recommended. Time of chemical control in late of February, in case of infestation.
brown_mite_op1 Plant	Method Season	Chemical spray # summer	brown_mite_op1	Advice	The treatment at this time is not recommended. Time of chemical control in late of May, in case of infestation.
flat_mite_op1 Plant	Method Season	Chemical spray Summer	flat_mite_op1	Advice	Spot spraying localized infestation is good practice and tractor drawn equipment with agitator is often the ideal machine for application. Spraying should be as a mist, tacking umbrella shape at lower pressure and as far as possible from downwards to up words and pointing to the core of tree.
flat_mite_op1 Plant	Method Season	chemical spray # summer	flat_mite_op1	Advice	The treatment at this time is not recommended. Time of chemical control in late of April, in case of infestation.

brown_mite_op2 Plant	Method Season	Chemical spray # summer	brown_mite_op2	Advice	The treatment at this time is not recommended. Time of chemical control in late of May, in case of infestation.
flat_mite_op2 Plant	Method Season	Chemical spray Summer	flat_mite_op2	Advice	Spot spraying localized infestation is good practice and tractor drawn equipment with agitator is often the ideal machine for application. Spraying should be as a mist, tacking umbrella shape at lower pressure and as far as possible from downwards to up words and pointing to the core of tree.
flat_mite_op2 Plant	Method Season	chemical spray # summer	flat_mite_op2	Advice	The treatment at this time is not recommended. Time of chemical control in late of April, in case of infestation.
citrus_nematude_op1	method	soil treatment	citrus_nematude_op1	Advice	You must follow this operation by light irrigation to avoid application of fruit bearing trees.
citrus_nematude_op2	method	soil treatment	citrus_nematude_op2	Advice	You must follow this operation by light irrigation to avoid application of fruit bearing trees.

4.2. Inference layer

The inference structure is modified to the following



4.3. Task layer

Task Layer Disorder Treatment
Goal finding the ordered treatment operation for the diagnostic disorder(s)

Use the output confirmed and highly confirmed disorders from diagnosis system as an input for this system. The treatment task is applaied when press treatment button in the treatment dialog screen.

PRESENT Citex Diagnosis & Treatment Screen
Obtain from sytem (Plantation.Current_Date)
Instantiate (Disorder + System description --> Partially Instantiated Treatment Operation)
For all Treatment Operations
IF number of (Treat_Op.Material_Name) > 1
THEN OBTAIN (Treat_Op.Disorder_Name, Material_Name1)
Set Treat_Op.Material_Name by Material_Name1
Assign (Partially Instantiated Treatment Operation + System Description ---> Instanitated Treatment Operation)
Order (Instantiated Treatment Operation ----> Ordered Treatment Operation)
PRESENT Treatment Result screan

5. Database

The integration is done with the end user in the database. Note that there are some modifications in the oriental design as follows:

1. The comment in the oriental design in the conceptual model part is modified to be as follows:
   "*the line ended by one arrow represents the one to one relation and by two arrows represents the one to many relation"*.
2. The table names: water, soil, and climate in the reference database are replaced by water referance, soil referance, climate referance.
3. The operation name 'new_protection_operation' in the interface component of protection operation is replaced by 'new'
4. The Button "New" is added for the following screans
   Soil & water data reference,
   climate data reference, and
   soil assessment data (farm name)
5. The Button "delete" is added for the following screen
   soil assessment data (farm name)
6. The type of the month field in climate_ref_table is modified to text
7. The length of the following fields are modify to be as following

File: caring_op_table

Field name	**new length**
did	2
fid	2
coid	2
op_name	50
material_name	50
unit	50
method of application	50
tool	50
advisor	50

File: climate_ref_table

Field name	**new length**
did	2
avg_rh	4
month	50

File: climate_table

Field name	new length
did	2
fid	2
avg_rh	4

File: directorate_table

Field name	new length
did	2
sid	2
dname	50

File: farm_table

Field name	new length
did	2
sid	2
fid	2
fname	50
area	4
irr-system	50
fert_system	50
drainage_system	50
nt	2
watersource	50
user_cont_water	50
variety_name	50

File: fertilization_op_table

Field name	new length
did	2
fid	2
foid	2
fertilizer_name	50
unit	50
advisor	50
method of application	50

tool	50

File: the governorate_table

Field name	new length
sid	2
gname	50

File: harvest_op_table

Field name	new length
did	2
fid	2
hoid	2
rank	50
unit	50
method of application	50
tool	50
advisor	50
qty	4

File: diagnosis_treatment_op_table

Field name	new lenght
did	2
fid	2
toic (not toid)	2
disorder	50
material_name	50
unit	50
method of application	50
tool	50
advisor	50
material qty	4

File: irrigation_op_table

Field name	new lenght
did	2
fid	2

ioid	2
unit	50
advisor	50
water qty	4

File: protection_op_table

Field name	**new lenght**
did	2
fid	2
poid	2
disorder	50
material_name	50
unit	50
method of application	50
tool	50
advisor	50
material qty	4

File: sector_table

Field name	**new lenght**
sid	2
sname	50

File: soil_assessment_table

Field name	**new lenght**
did	2
fid	2
boron	4
chloride_sulphate	4
rsc	4
sar	4
profile depth	4
ca_carbonate	4
max_d_tc_ss	4
min_d_rh_ss	4

File: soil_ref_table

Field name	new lenght
did	2
texture	50
water_table_level	4
ec	4
ph	4
esp	4
fc	4
pmp	4

File: soil_table

Field name	new lenght
did	2
fid	2
texture	50
water_table_level	4
ec	4
ph	4
esp	4
fc	4
pmp	4

File: water_table

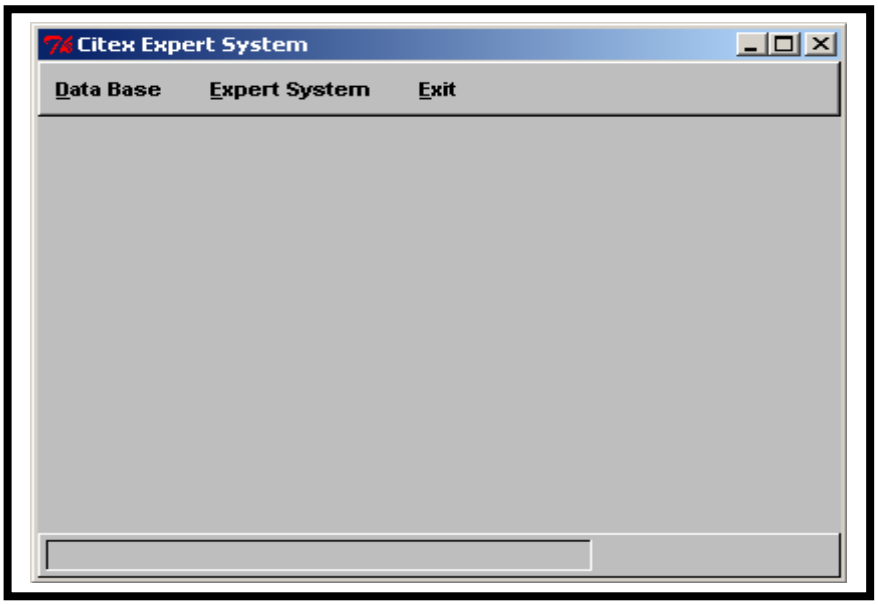
Field name	new lenght
did	2
fid	2
eciw	4

File: water_ref_table

Field name	new lenght
did	2
eciw	4

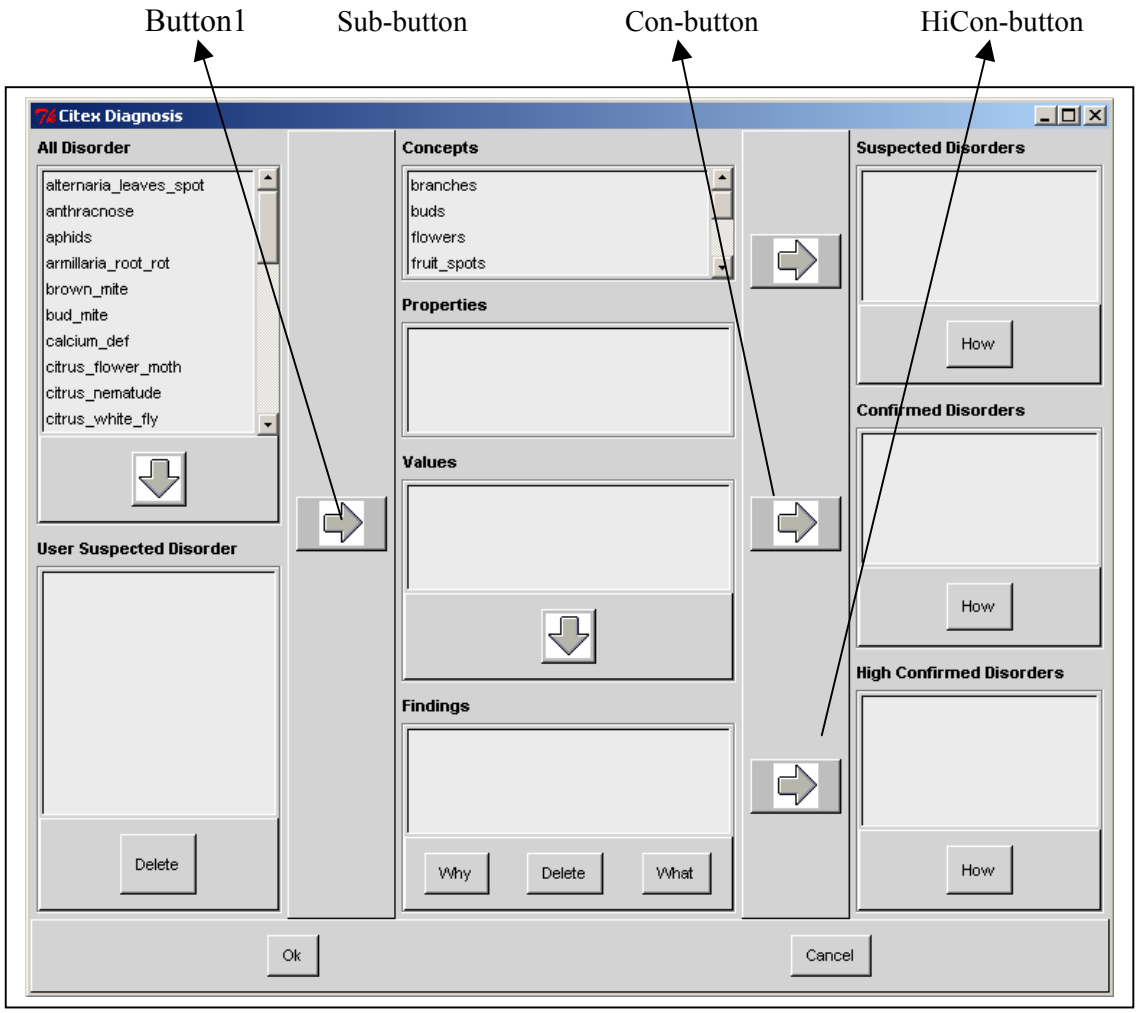
6. User Interface

Some screens are added and others are modified. Citex main screen is added to integrate the whole system. The following comments and screen describe those modifications:

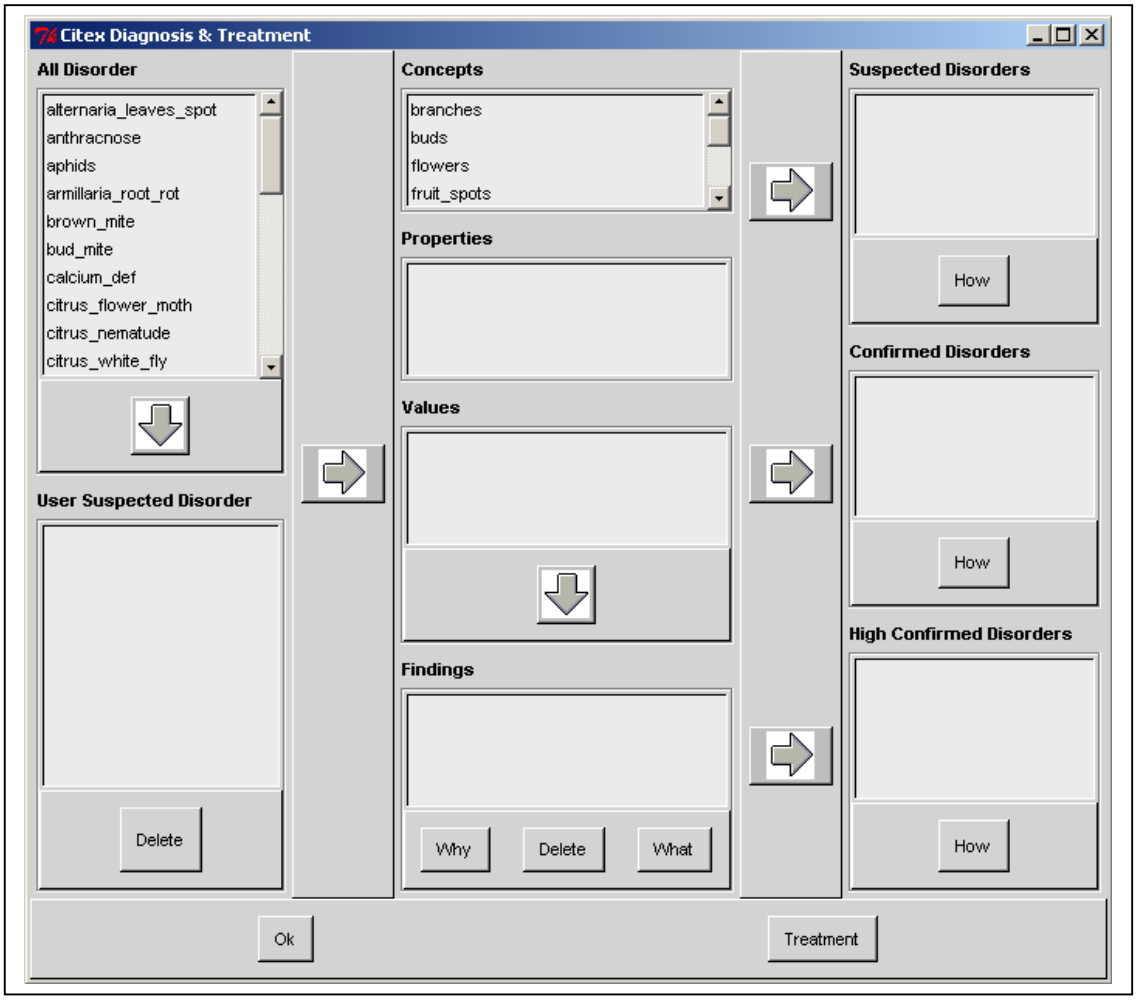


Citex Main Screen

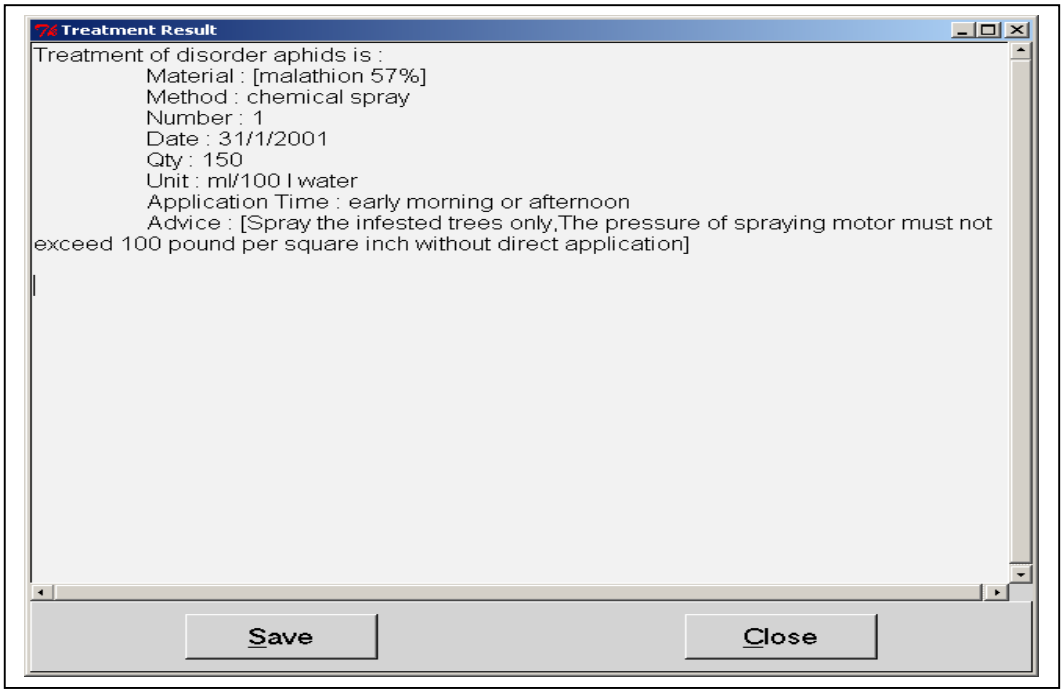
- The Data Base menu contains the “User” option, which display the database user main screen.
- The Expert System menu contains the “Diagnosis” and “Diagnosis & Treatment” options. The “Diagnosis” option will run the diagnosis subsystem, and the “Diagnosis and Treatment” will display the Citex Diagnosis & Treatment Screen.



Citex diagnosis Screen

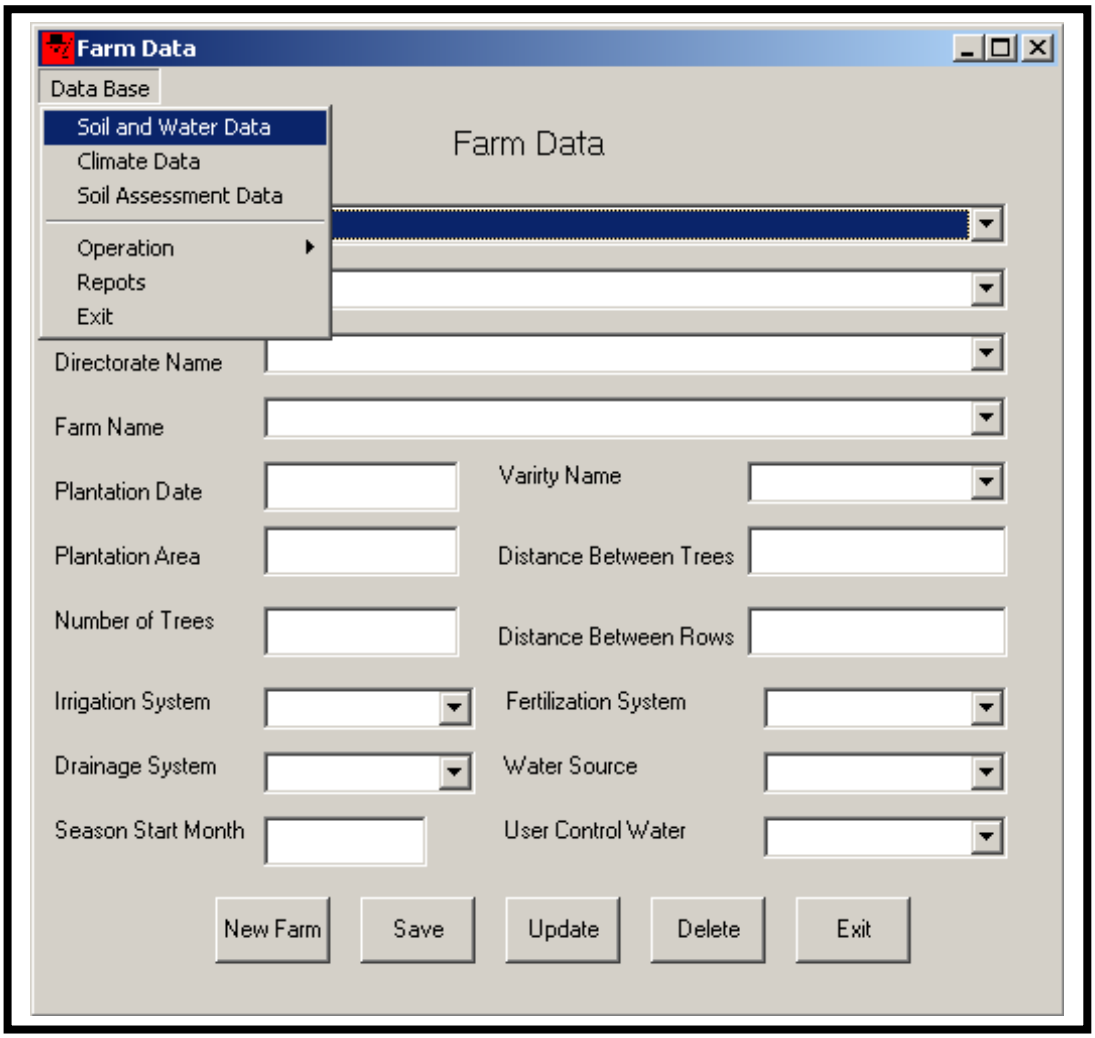


Citex Diagnosis & Treatment Screen



Treatment Result screen

Database Interface



Database user- main screen.

7. Test cases

7.1 *Diagnosis Test Case*

Case 1

Variety Name : Valencia
Plantation Date : 1-1-90
Current Date : 1-7-98
Leaves color : black
Leaves shape : honey dew
Leaves l_status : insect_presented
Insect color : white
Insect status : flying

Conclusion

Disorders confirmed likely
Mealy bug
Disorders confirmed Most likely
Citrus white fly

Case 2

Variety Name: Navel
Soil pH: 7.0
EC: 2.0
ECiw: 2.0
Calcium Carbonate: 8.0
Initial Observation
Leaves color: yellow
Buds color: brown
Branches status: stunted
Branches type: flushed
Leaves type: new leaves
Leaves position: veins

Conclusion

Disorders confirmed likely
Bud mite, Calcium def.
Disorders confirmed Most likely
iron def.

Case 3

Variety Name : Valencia
Plantation Date: 1-1-80
Current Date: 1-7-98
Leaves color: green
Branches color: spotted yellowish
Trunk shape: lichen growths
Branches status: gray fellvet

Conclusion

Disorders confirmed Most likely
lichens

Case 4
Variety Name: Valencia
Plantation Date: 1-1-90
Current Date: 1-7-98
Leaves color: green, yellow
Leaf spots exists: yes
Leaf spot color: brown
Leaf spot position: lower surface
Conclusion
Disorders confirmed likely
Gum spots

Case 5
Variety Name: Lime
Plantation Date: 1-1-80
Current Date: 1-12-98
Leaf spots exists: yes
Fruits color: rust
Fruits status: rough
Leaf spot color: brown
Leaf spot position: scattered
Conclusion
Disorders confirmed Most likely
Rust mite

7.2 *Treatment Test Case*

Case 1
Disorders Name: Stubborn
Plantation Date: 1-1-90
Current Date: 1-12-2000
Conclusion
Operation Number 1
Operation Date 1-12-2000
Disorder name stubborn
Material Name none
Advice Infected young trees should be replaced by other healthy plants. Use certified transplants.

Case 2
Disorder(s) name: citrus_white_fly, manganese_def
Current Date 1-7-2001
Conclusion
Operation Number 1
Operation Date 1-7-20001
Disorder name citrus_white_fly
Material Name vertimec 1.8%
Qty 30
Unit ml/100 l water

Method chemical spray
Advice The pressure of spraying motor must not exceed 100 pound per square inch without direct application Spray the infested trees only.
Operation Number 2
Operation Date 4-17-2001
Disorder name manganese_def
Material Name micro element mixture
Unit: as below
Method foliage nutrition
Advice The micro elements mixture is formulated, for every 100 lt water, as follow : 30 gm Iron Chelate (EDTA) + 30 gm Zinc Chelate + 75 Mang. Chelate + 6 gm Copper Sulfate + 30 Magnesium Sulfate + 0.3 gm Borax

Case 3
Disorder name: scales
Current Date 1-7-2001
Selected Material kimisol 95%
Conclusion
Operation Number 1
Operation Date 1-7-2001
Disorder name scales
Material Name kimisol 95%
Qty 1.6
Unit L/100 l water
Method chemical spray
Advice Use fit spraying motor with good mixingThe trees must be completely washed.

Case 4
Current Date 1-4-2000
Selected Material super aside
Conclusion
Operation Number 1
Operation Date 1-4-2000
Disorder name citrus_flower_moth
Material Name super aside
Qty 200
Unit gm/100 l water
Method chemical spray
Advice The pressure of spraying motor must not exceed 100 pound per square inch without direct application. Spray trees of entire farm.