Biomass Production Chain and Growth Simulation Model for Kenaf

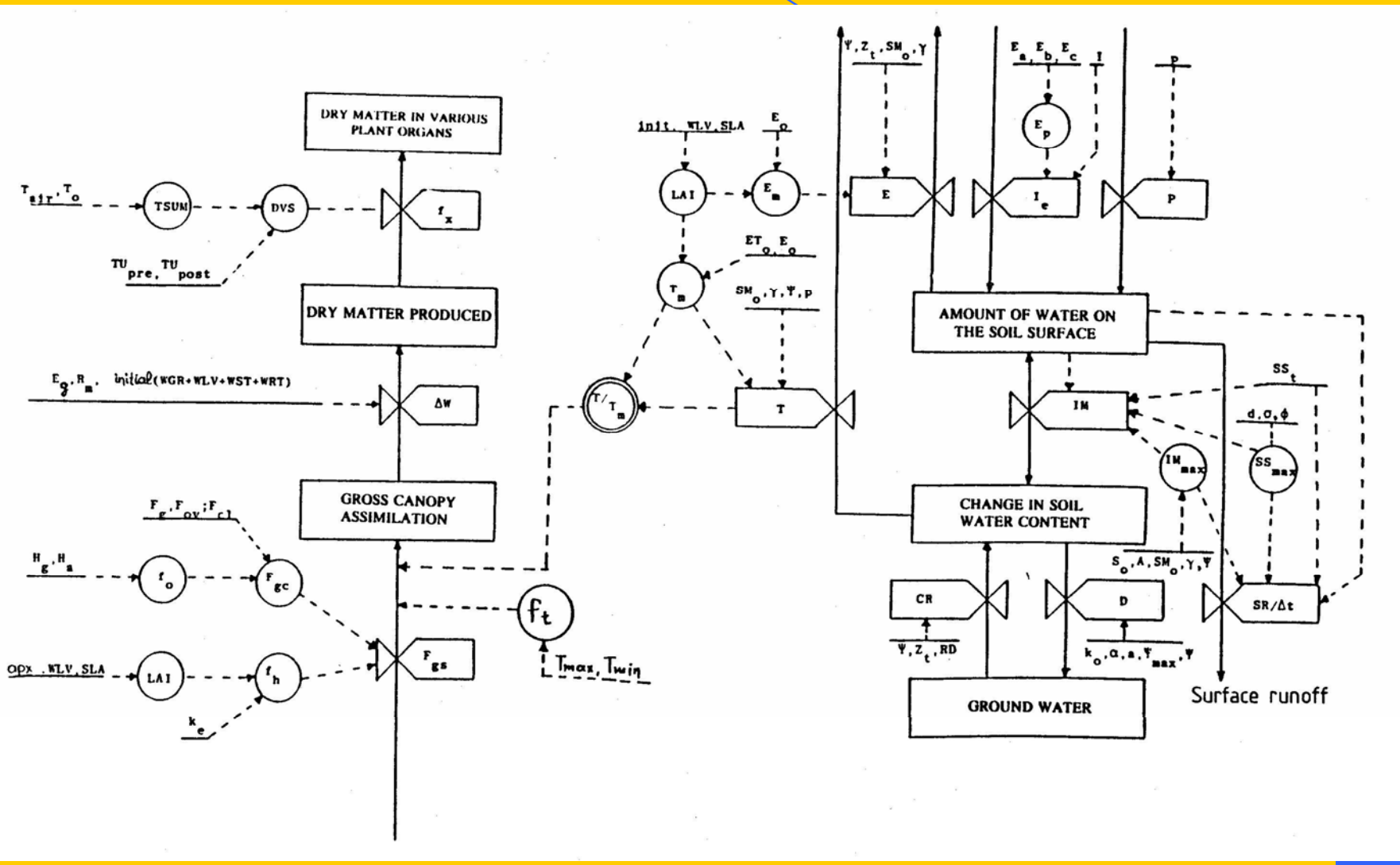
QLK5-CT-2002-01729

WP3. Development of the Kenaf growth simulation model

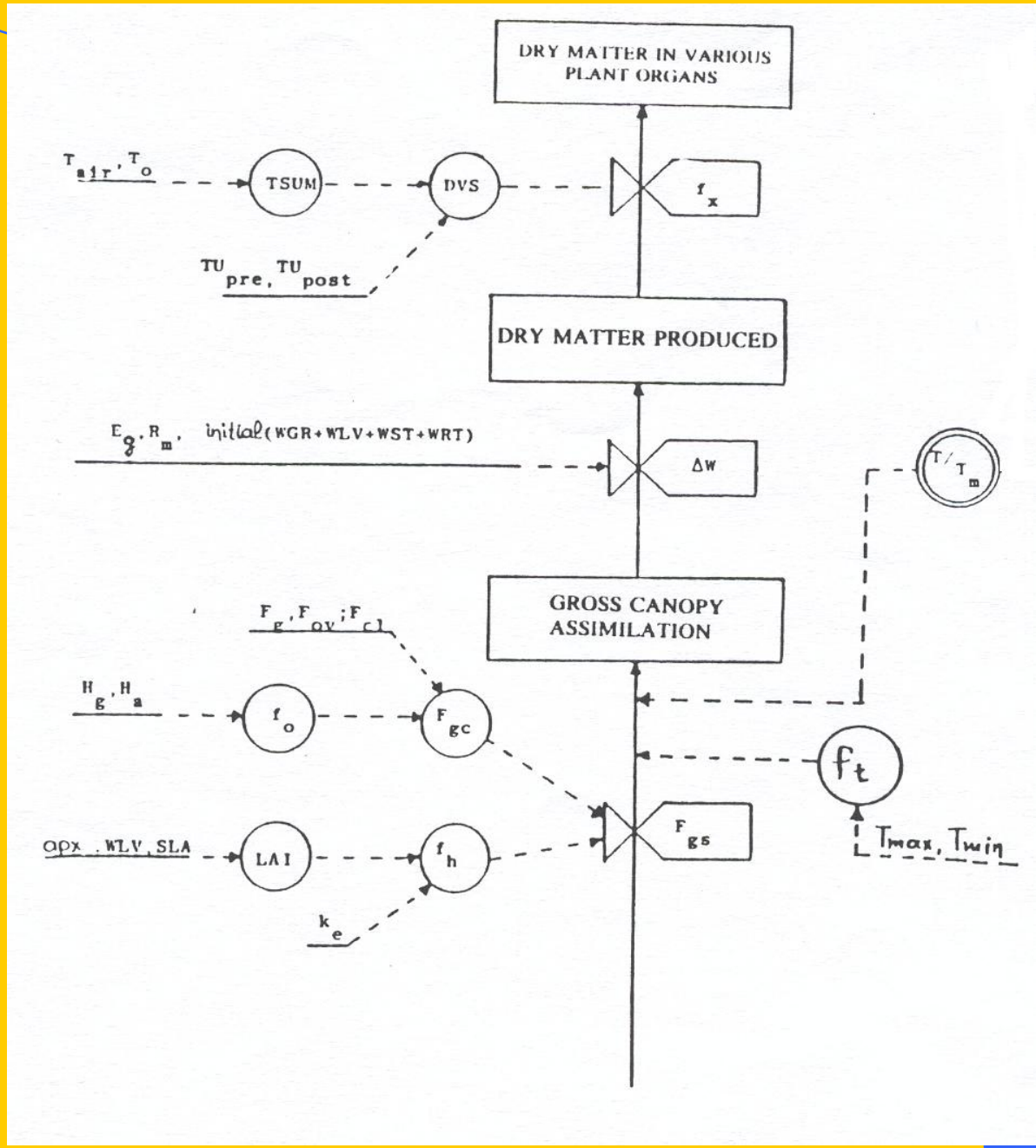
University of Thessaly (UTH)

Department of Agriculture,Crop Production & Agricultural Environment

Simplified flow chart of kenaf production during one interval of calculations



Production Situation 1

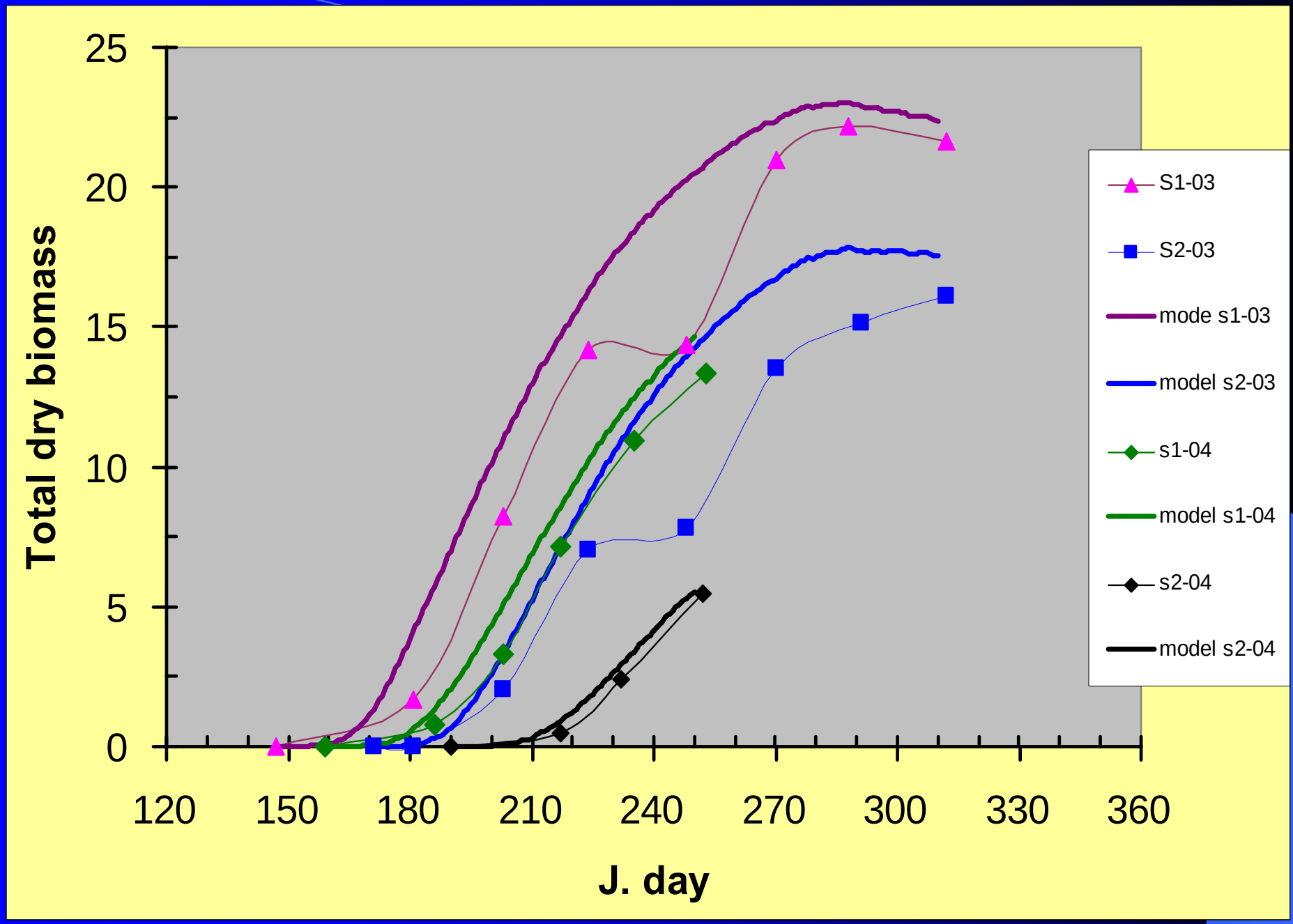


Canopy Assimilation

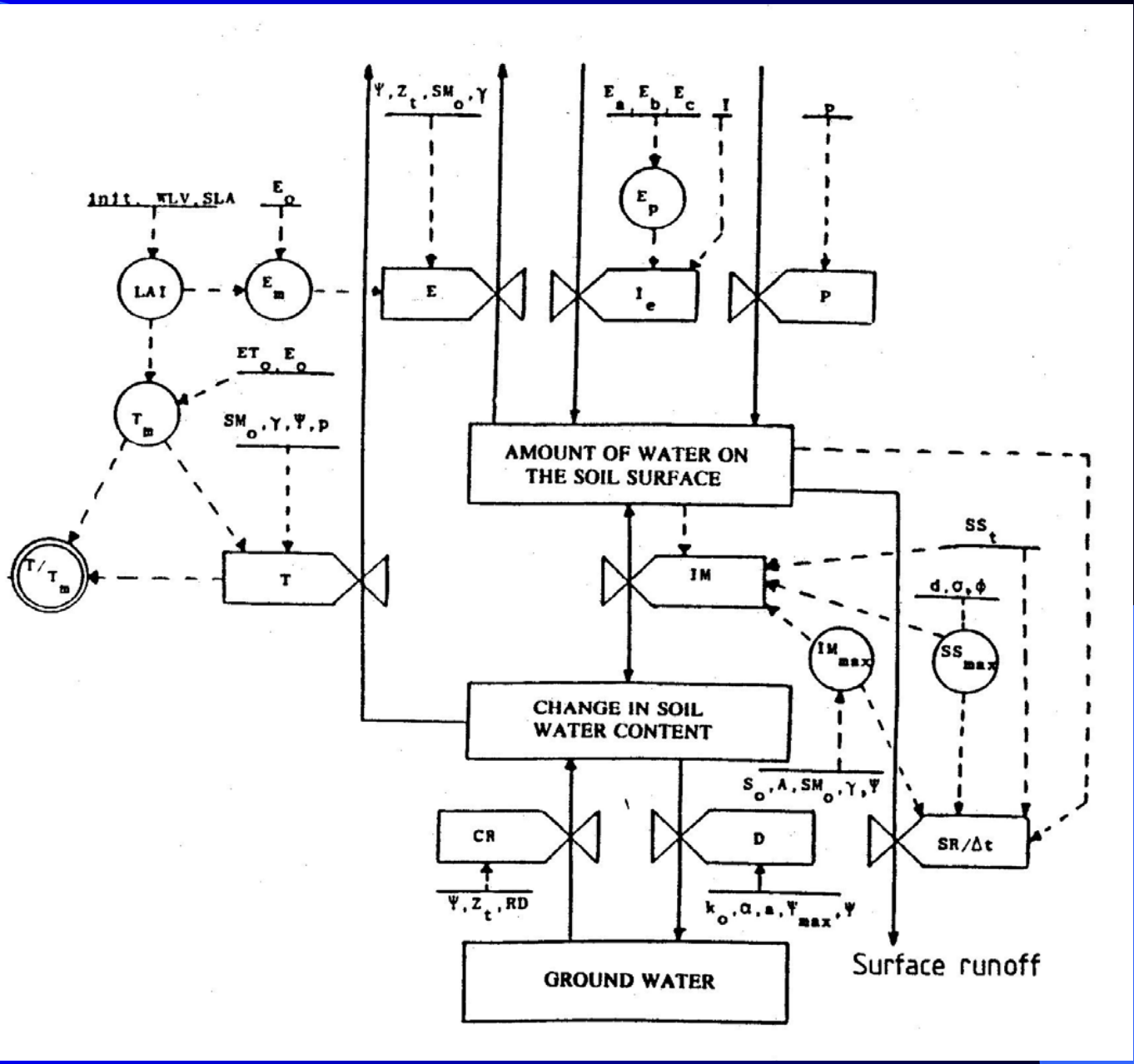
- ✓Angle of radiation interception
- ✓Light distribution within the crop canopy
- ✓ Effect of direct and diffuse radiation
- ✓Leaf area (index)
- ✓Leaf angle (extinction coefficient)

Model operations

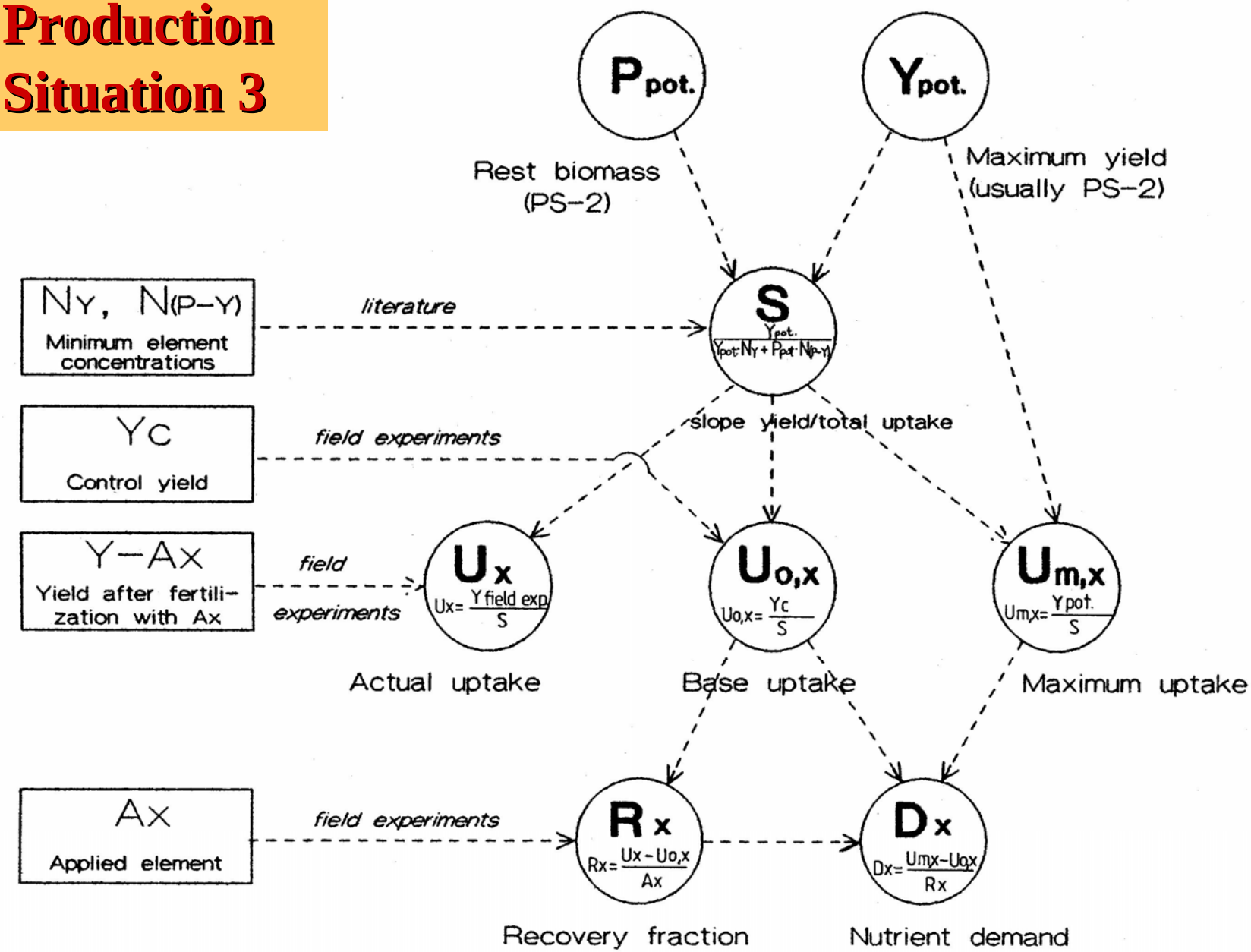
- ✓ Calculation of global radiation
- ✓ Differentiation of direct from diffuse radiation
- ✓ Calculation of PAR
- ✓ Calculation of radiation within the canopy
- ✓ Calculation of gross canopy assimilation rate
- ✓ Calculation of dry mass productivity
- ✓ Dry mass separation to plant organs


Total dry biomass
25
20
15
10
5
0
120
150
180
210
240
270
300
330
360
J. day
S1-03
S2-03
mode s1-03
model s2-03
s1-04
model s1-04
s2-04
model s2-04

Production Situation 2



Production Situation 3



Data required by the partners

- Location
  - ✓ Latitude
  - ✓ Longitude
  - ✓ Altitude

Data required by the partners

- Meteorological data (daily):
  - ✓ max temperature (°C)
  - ✓ min temperature (°C)
  - ✓ global radiation (W/m^2) or sunshine hours
  - ✓ air humidity (%)
  - ✓ wind speed (m/s)
  - ✓ rainfall (mm)
  - ✓ evaporation (mm)

Data required by the partners

- Crop data (every 3 weeks):
  - dry weight per plant organ (kg/ha)
  - leaf area index
  - specific leaf area (m^2/kg)
  - Plant height (cm)

Plant height (cm)

table 1

harvest	DAY	J. Day	D.A.E	I1	I2	I3	No	N1	N2	N3
	7/6/04	159	0	0	0	0	0	0	0	0
1η	4/7/04	186	27	53	53	53	53	53	53	53
2η	21/7/04	203	44	114,1	125,5	132	120	133,3	121,1	121,3
3η	4/8/04	217	58	184,16	200,5	200,83	197,88	198,33	199,44	185
4η	22/8/04	235	76	203,3	218,3	221,5	213,3	215,8	210,5	217,7
5η	9/9/04	253	94	212,9	236,6	247,9	234,4	237,2	236,6	221,6
6η										
7η										
8η										
9η										

Data required by the partners

- Crop data:
  - day of sowing
  - seed weight (kg/ha)
  - day of 50% emergence
  - day of 50% flowering
  - day of maturity
  - N-concentrations (stem, leaves, s.o.)

Data required by the partners

- Management data:
  - irrigation dates
  - effective irrigation rate (cm/application)
  - irrigation intensity (cm/hour)

Data required by the partners

- minimum soil data:
  - ✓ textural analysis 0-20, 20-60 cm
  - ✓ organic matter content (0-20 cm)
  - ✓ gravel content 0-20, 20-60 cm
  - ✓ total pore space ($cm^3 cm^{-3}$) 0-20, 20-60 cm
  - ✓ dry bulk density ($g\ cm^{-3}$) 0-20, 20-60 cm
  - ✓ results of infiltration experiments (2 replicates) with different initial soil moisture contents
  - ✓ soil moisture content at sowing, emergence, every 2-3 weeks throughout growing period
  - ✓ groundwater depth emergence, every 2-3 weeks throughout growing period

Plant height (cm)

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