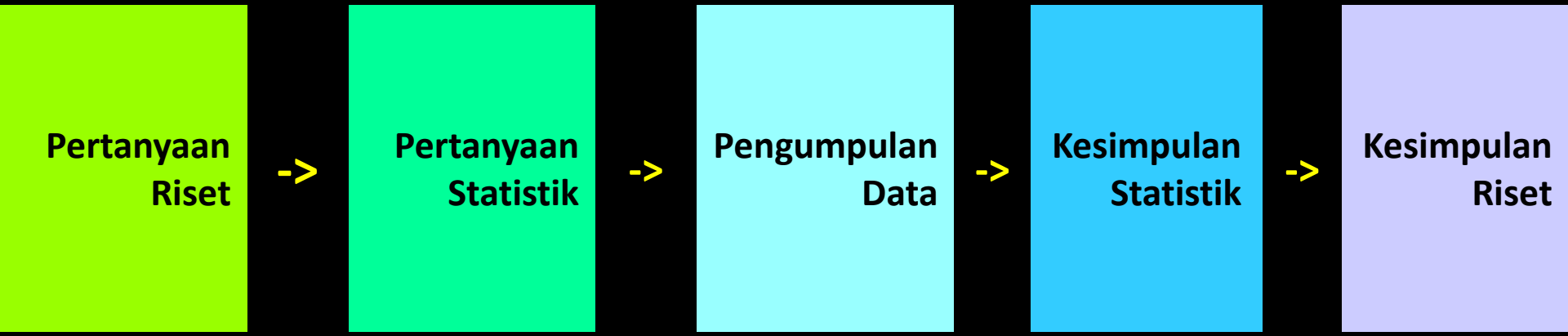
Presentasi Hasil Penelitian/Riset

Sekuens/Urutan riset



Sekuens Riset

Pertanyaan Riset

- Apakah pemupukan Nitrogen meningkatkan hasil tanaman jagung?

Pertanyaan Statistik

- H_o: Apakah pemupukan N **tidak berpengaruh** terhadap hasil jagung?
- H_1: Apakah pemupukan N berpengaruh terhadap hasil jagung?

Sekuens Riset

Kesimpulan Statistik

- Pemupukan N **berpengaruh** terhadap hasil jagung.

Kesimpulan Riset

- Pemupukan N **meningkatkan** hasil jagung 28 % dibandingkan tanpa pemupukan N.

Penyajian hasil riset atau penelitian

- Berupa kata-kata/teks
- Berupa angka/tabel
- Berupa grafik
- Berupa gambar
- Berupa diagram

Penyajian berupa kata

- Mikoriza meningkatkan pertumbuhan vegetatif, komponen hasil dan hasil tanaman padi gogo.

- Stress air meningkatkan persentase gabah hampa, namun tidak menurunkan hasil padi gogo varietas Situ Patenggang.

- Interaksi stress air dan mikoriza tidak berpengaruh nyata terhadap semua peubah kecuali terhadap peningkatan bobot kering akar.

Penyajian berupa angka atau tabel atau grafik

- Secara umum tabel lebih baik dari grafik untuk memberi informasi numerik/angka.

- Grafik lebih baik untuk menggambarkan tren (kecenderungan), untuk perbandingan atau memperlihatkan hubungan antar variabel.

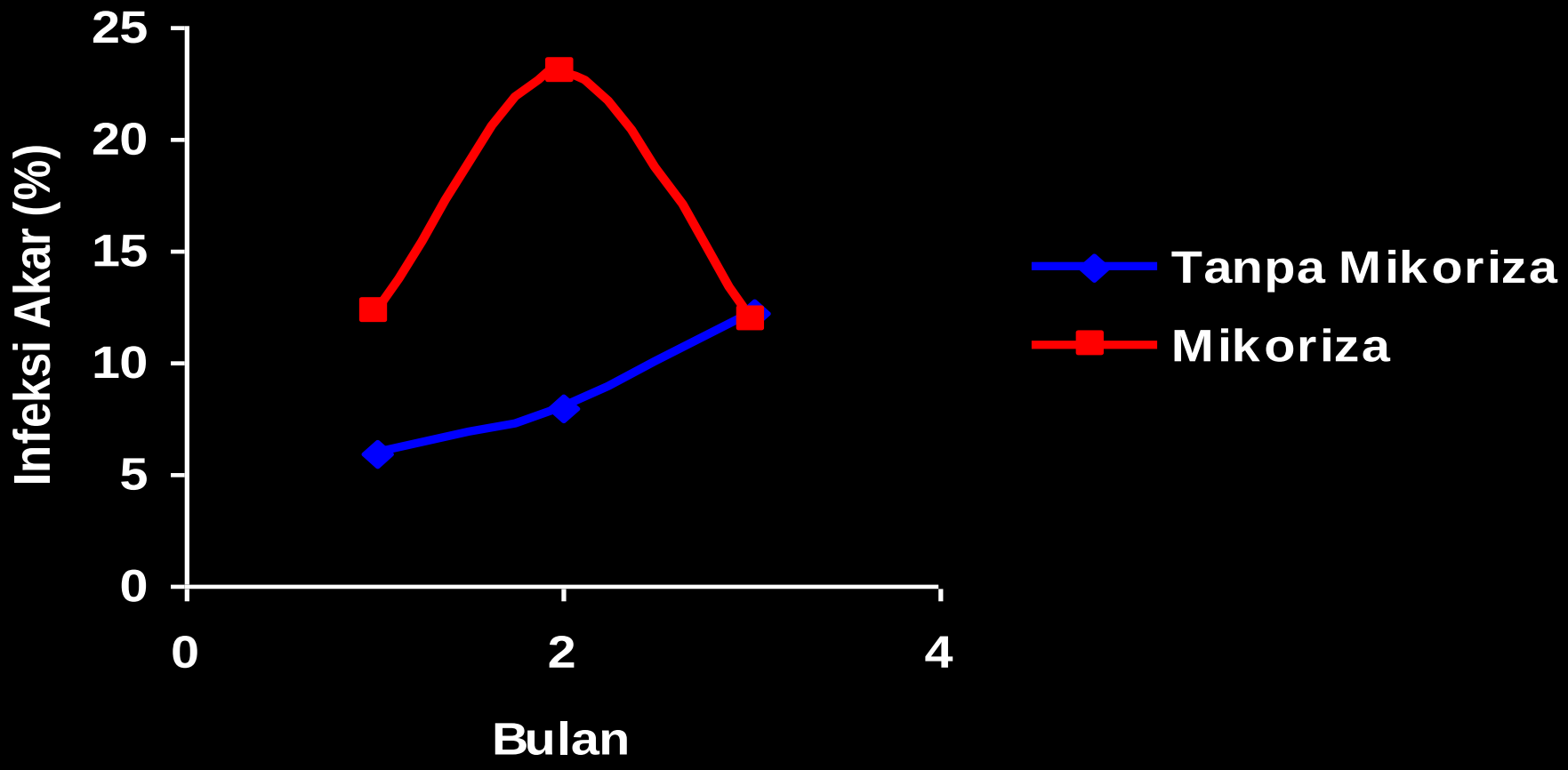
Tabel 2. Pengaruh Mikoriza Terhadap Komponen Hasil

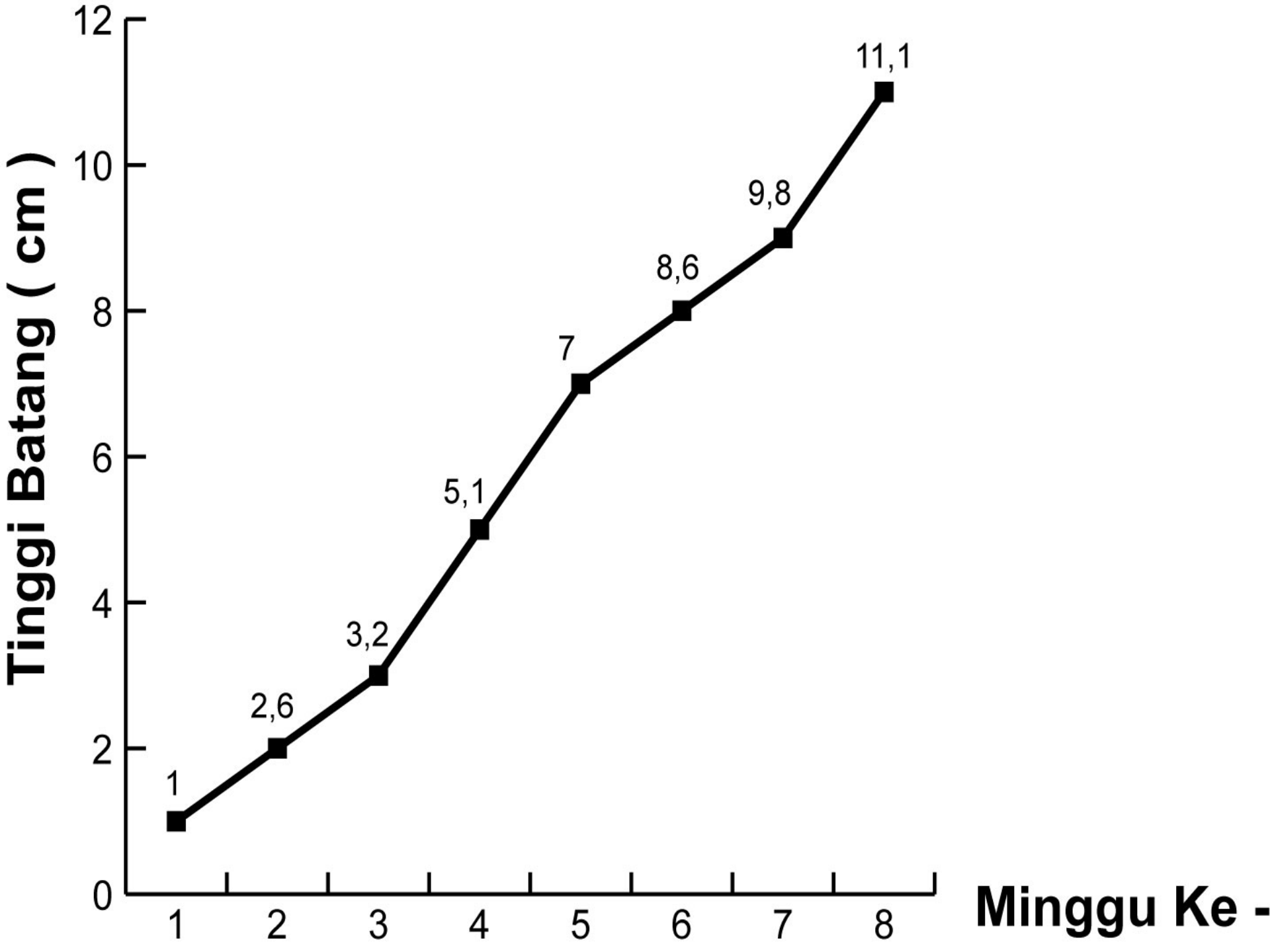
Perlakuan	Anakan Produktif	Panjang Malai (cm)	Jumlah Gabah/Malai			% Gabah Hampa
			isi	hampa	total	
Tanpa Mikoriza	10.507b	23.295b	110.036b	80.987	190.320	39.703
Mikoriza	12.240a	24.970a	129.236a	69.627	199.560	35.001

Tabel 3. Pengaruh Mikoriza Terhadap Komponen Hasil dan Hasil

Perlakuan	Bobot Gabah/Malai (g.)			Bobot 1000 Butir (g.)	GKP/Rumpun (g.)	GKG/Rumpun (g.)
	isi	hampa	total			
Tanpa Mikoriza	2.347b	0.264	2.611b	22.551	34.892b	29.398b
Mikoriza	2.860a	0.286	3.146a	23.846	39.452a	33.589a

Gambar 1. Pengaruh Mikoriza terhadap Persentase Infeksi Akar.




Tinggi Batang (cm)
12
10
8
6
4
2
0
1
2,6
3,2
5,1
7
8,6
9,8
11,1
1
2
3
4
5
6
7
8
Minggu Ke -

Tabel yang baik

- Legenda lengkap
- Berdiri sendiri
- Ada satuannya
- Ada keterangan
- Ada garis pemisah yang jelas antara angka dan teks.

Table 2. Planting date, mean planting density, and total number of seed clams planted in plots at Filucy Bay and Wescott Bay in 1979.

Location	Plot code	Planting date	Mean planting density in no. clams/m^2 ± 1 st. dev.(N)	Total no. clams planted
Filucy Bay	F10 x 30	5-16-79	994 ± 39(5)	298200
	F3 x 10	5-24-79	994 ± 39(5)	29820
Wescott Bay	W10 x 25	5-16-79	994 ± 39(5)	248500
	W3 x 10	6-2-79	895 ± 35(5)[a]	26850

[a]Calculated after clams were planted based on estimated 11% mortality of seed clams between 5-24 and 6-2-79.

Tabel yang baik

- **Tabel** seharusnya berdiri sendiri dan dapat menerangkan dirinya sendiri (**be self-explanatory).**

- Pembaca seharusnya dapat memahami tabel tanpa melihat teks lain yang menyertainya.

Tabel 1. Tingkat kerusakan daun, daya makan ulat, umur bertahan hidup ulat, dan tingkat kematian ulat setelah diaplikasi dengan *Sl*NPV, Bogor, Oktober 1989.

Konsentrasi (PIBs/ml)	Kerusakan daun (%)	Daya makan ulat (cm^2)	Umur ulat (hsa)	Kematian ulat (%)
Kontrol	90,9 a	236,6 a	18,0 a	0 a
5×10^6	63,0 b	93,2 b	12,7 b	70 b
1×10^7	63,0 b	64,5 b	10,5 bc	80 b
5×10^7	39,2 c	38,7 b	10,5 bc	80 b
1×10^8	30,0 cd	28,8 b	9,5 bc	100 b
5×10^8	18,4 d	33,4 b	8,7 c	100 b

Angka-angka selajur yang diikuti dengan huruf yang sama tidak berbeda menurut uji Duncan pada taraf nyata 5%.

Tabel 2. Persentase kerusakan daun kedelai varietas Orba akibat infestasi ulat grayak pada berbagai tingkat populasi ulat dan stadia tanaman. Mojosari, Jawa Timur, MK 1987[a].

Stadia tanaman	Persentase kerusakan daun					Rata-rata
	A	B	C	D	E	
V_6-V_7	0^{a}	$24,4^{bcde}$	$31,9^{cdef}$	$47,1^{fgh}$	$77,6^{i}$	$36,2^{X}$
R_1-R_2	0^{a}	$19,5^{bcd}$	$28,1^{cde}$	$37,3^{efgh}$	$50,2^{h}$	$27,0^{Y}$
R_3-R_4	0^{a}	$18,6^{bc}$	$28,5^{cde}$	$37,4^{efgh}$	$48,1^{gh}$	$26,5^{Y}$
R_5-R_6	0^{a}	$15,2^{b}$	$25,2^{bcde}$	$34,3^{efg}$	$45,3^{fgh}$	$24,0^{Y}$
Rata-rata	0^{A}	$19,4^{B}$	$28,4^{C}$	$39,0^{D}$	$55,3^{E}$	

[a]Angka-angka yang diikuti huruf sama tidak berbeda nyata pada taraf 5% UBD.

Stadia tanaman:

V_6-V_7 = stadium vegetatif akhir dengan 6-7 tangkai daun.
R_1-R_2 = stadium pembungaan.
R_3-R_4 = stadium pembentukan polong.
R_5-R_6 = stadium pengisian biji.

Populasi ulat:

A = 0 ekor/rumpun.
B = 0,5 ekor/rumpun.
C = 1 ekor/rumpun.
D = 2 ekor/rumpun.
E = 4 ekor/rumpun.

Tabel 3. Perbandingan*) jenis, populasi, dan indeks diversitas Arthropoda pada perlakuan waktu tanam dan pestisida dengan waktu tanam yang sama dalam ekosistem padi varietas IR64 berpola tanam padi-padi-padi. Pemalang, MT 1995/96.

Uraian	Penjaringan			Pemangkasan			Visual		
	WT	PES		WT	PES		WT	PES	
		S	TS		S	TS		S	TS
Jumlah jenis									
Arthropoda	TS	-	-	-	TP	TP	TS	-	TP
Musuh alami	TS	TP	-	S	TP	TP	TS	TP	-
Hama	TS	-	-	S	P	TP	-	P	P
Ukuran populasi									
Arthropoda	S	TP	-	TS	-	TP	TS	TP	TP
Musuh alami	-	-	-	TS	TP	TP	TS	TP	TP
Hama	-	-	P	S	P	TP	TS	TP	TP
Indeks diversitas	TS	-	-	-	TP	TP	-	-	-

*) Pernyataan berbeda nyata didasarkan atas perbedaan nilai data >10%; WT= waktu tanam; PES= pestisida; TS= berbeda nyata, data pada waktu tanam tidak serempak > serempak; S= berbeda nyata, data pada waktu tanam serempak > tidak serempak; P= berbeda nyata, data pada perlakuan dengan pestisida > tanpa pestisida; TP= berbeda nyata, data pada perlakuan tanpa pestisida > pestisida; - = tidak berbeda nyata.

Tabel 4. Pengaruh Stress Air Terhadap Persentase Infeksi Akar dan P-Jaringan.

Perlakuan	Infeksi Akar (%)			PJaringan (%)
	1Bulan	2 Bulan	3Bulan	
Tanpa Stress Air	8.78	19.86ab	20.70a	0.143e
Stress Anakan	10.44	6.48b	8.09b	0.170d
Stress Primordia	10.11	9.56b	7.72b	0.203c
Stress Pembungaan	8.74	11.13b	10.42b	0.238b
Stress Pengisian Bulir	7.09	30.16a	13.47ab	0.272a

Table 2a: Mean intakes of milk, supplement and water and mean growth rates for four diets

	Diet[1]			
Variable	I	II	III	IV
Milk Intake	9.82	10.48	8.9	9.15
Supplement intake	0	449.5	363.6	475.6
Growth rate	89	145.32	127.8	131.5
Water intake	108.4	143.6	121.29	127.8

Diet I = Control; Diet II = Lucerne supplement; Diet III = Leucaena; Diet IV Sesbania

Table 2b: Mean growth rate and intakes of supplement, milk and water for 4 diets.

Supplement	Growth rate	Supplement intake	Milk intake	Water intake
	(g/day)	(g/day)	(ml/kg$^{0.75}$)	(ml/kg$^{0.75}$)
Lucerne	145	450	10.5	144
Sesbania	132	476	9.2	128
Leucaena	128	364	8.9	121
None	89	0	9.8	108

Table 7.4. Fruit yield, fruit drop and fruit weight on Year 2001 and 2002

Treatment and Year	Fruit harvested	Fruit drop	Fruit drop (%)	Fruit weight (kg/tree)	Average fruit weight (g)	Fruit size (cm)
	Year 2001					
WT	268 a	536.4 a	62.00 a	17.26 a	73.05 ab	5.06 a
W-1	367 a	627.8 a	59.90 a	21.40 a	69.14 b	5.05 a
W-4	332 a	614.4 a	66.80 a	18.80 a	79.72 a	5.32 a
	Year 2002					
WTT	238 bc	550 c	66.99 c	12.83 bc	55.23 a	4.10 a
WS	118 c	331 d	65.50 d	6.40 c	52.04 a	4.49 a
W1	446 ab	735 b	66.49 b	21.80 ab	50.31 a	4.12 a
W2	510 ab	753 b	54.18 b	27.50 a	53.87 a	4.42 a
W4	660 a	1787 a	68.53 a	31.88 a	51.86 a	4.55 a

Note: data with the same letter on the same column, not significant on LSD 5 %.

Note:

WT : Water stress with ground cover
WTT : Water stress without ground cover
W-1 : 50 L water/hour
W-2 : 100 L water/hour
W-4 : 200 L water/hour

Table 7.4. Fruit yield, fruit drop and fruit weight on Year 2001 and 2002

Treatment and Year	Fruit harvested	Fruit drop	Fruit drop (%)	Fruit weight (kg/tree)	Average fruit weight (g)	Fruit size (cm)
Year 2001						
WT	268 a	536.4 a	62.00 a	17.26 a	73.05 ab	5.06 a
W-1	367 a	627.8 a	59.90 a	21.40 a	69.14 b	5.05 a
W-4	332 a	614.4 a	66.80 a	18.80 a	79.72 a	5.32 a
Year 2002						
WTT	238 bc	550 c	66.99 c	12.83 bc	55.23 a	4.10 a
WS	118 c	331 d	65.50 d	6.40 c	52.04 a	4.49 a
W1	446 ab	735 b	66.49 b	21.80 ab	50.31 a	4.12 a
W2	510 ab	753 b	54.18 b	27.50 a	53.87 a	4.42 a
W4	660 a	1787 a	68.53 a	31.88 a	51.86 a	4.55 a

Note: data with the same letter on the same column, not significant on LSD 5 %.

Note:

WT : Water stress with ground cover
WTT : Water stress without ground cover
W-1 : 50 L water/hour
W-2 : 100 L water/hour
W-4 : 200 L water/hour

Kurangi ‘kerumitan’ tabel

Pengamatan Jumlah Daun Gugur Pohon Akasia di 3 lokasi

	Gobah	Panam	Kulim
January	11,532,234	14,123,654	3,034,564
February	1,078,456	12,345,567	16,128,234
March	17,234,778	6,567,123	16,034,786
April	16,098,897	10,870,954	7,940,096
May	8,036,897	10,345,394	14,856,456
June			4,123,656
July			18,885,786
August	8,674,234	18,107,110	17,230,095
September	4,032,045	18,923,239	9,950,498
October	2,608,096	9,945,890	5,596,096
November	5,864,034	478,023	6,678,125
December	12,234,123	9,532,111	3,045,654

Terlalu detail !

Daun gugur (juta)

In 10^6	Gobah	Panam	Kulim
January	11	14	3
February	1	12	16
March	17	6	16
April	16	10	7
May			14
June			4
July	8	15	18
August	8	18	17
September	4	18	9
October	2	9	5
November	5	0	6
December	12	9	3

Lebih simpel

Gambar/Figures

- Dibuat untuk menambah pengertian yang sulit di”lukis”kan dengan kata-kata.
- Harus jelas, akurat dan sesuai
- Jangan banyak “dekorasi”
- Memerlukan legenda (keterangan pelengkap)

Parts of a Graph (line)

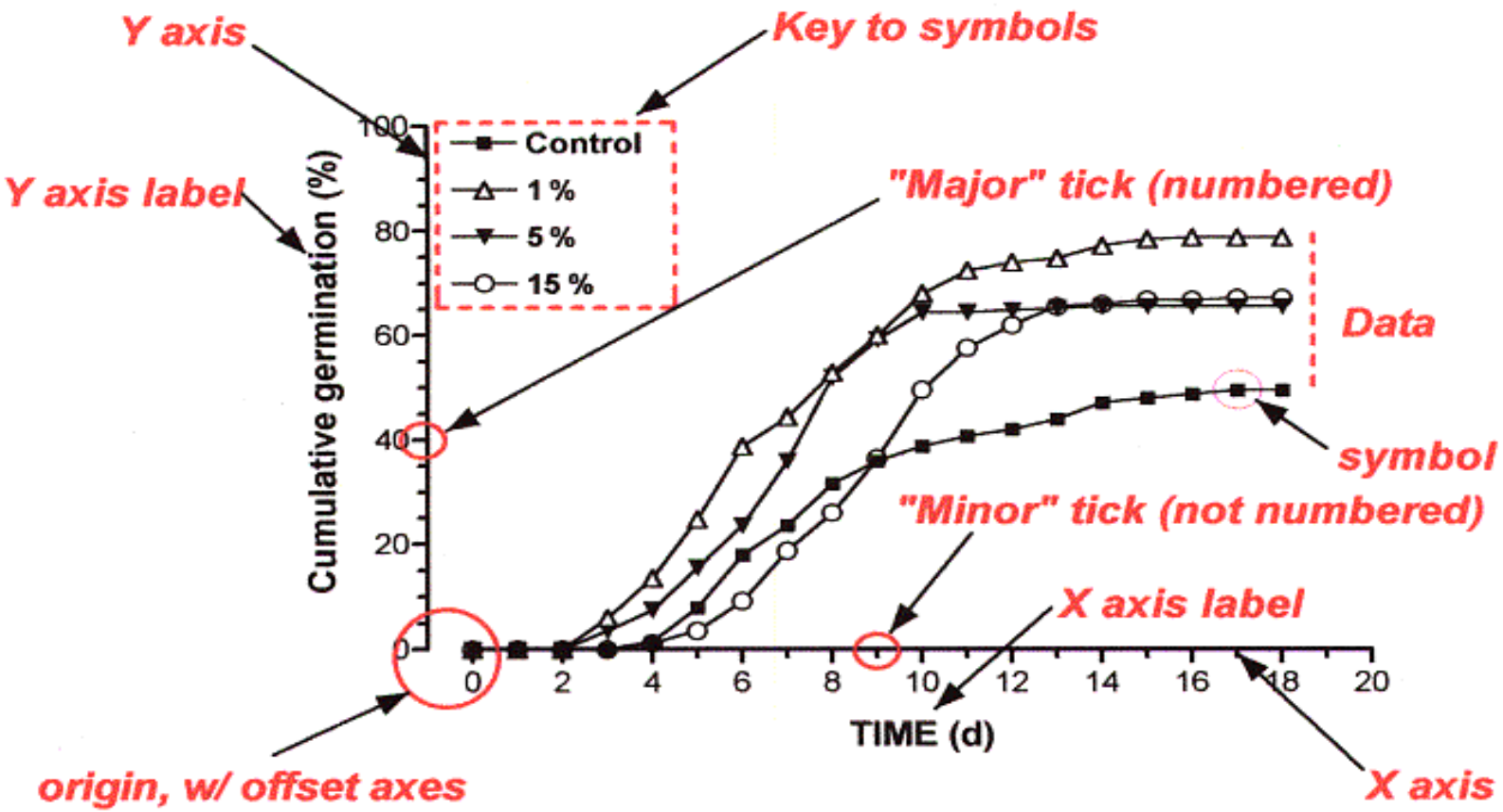


Figure 1. Cumulative percent germination of *Chenopodium* seeds after pregermination treatment of 2 day soak in NaCl solutions. All NaCl pretreatments increased the overall germination rate over the control (2 day soak in tapwater) and moved up the onset of germination by approximately two days at concentrations of 1 and 5%.

legend

Grafik Garis/Line

- Grafik garis/line menampilkan data dan informasi dalam bentuk garis. Grafik line digunakan untuk menampilkan data yang terkait dengan waktu.
- Data yang boleh digunakan adalah data kontinu (contoh tinggi tanaman dari minggu ke minggu).
- Wajib dilengkapi dengan sumbu X, sumbu Y, judul dan keterangan.

Grafik garis

- Memiliki dua aksis (X dan Y)
- Dari data kontinu
- Buatlah kurvanya "menonjol"
- Memberikan simbol berbeda, lebih baik dari garis yang berbeda.

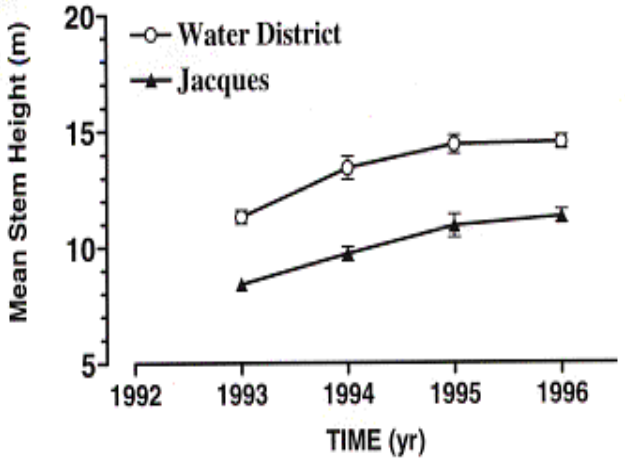
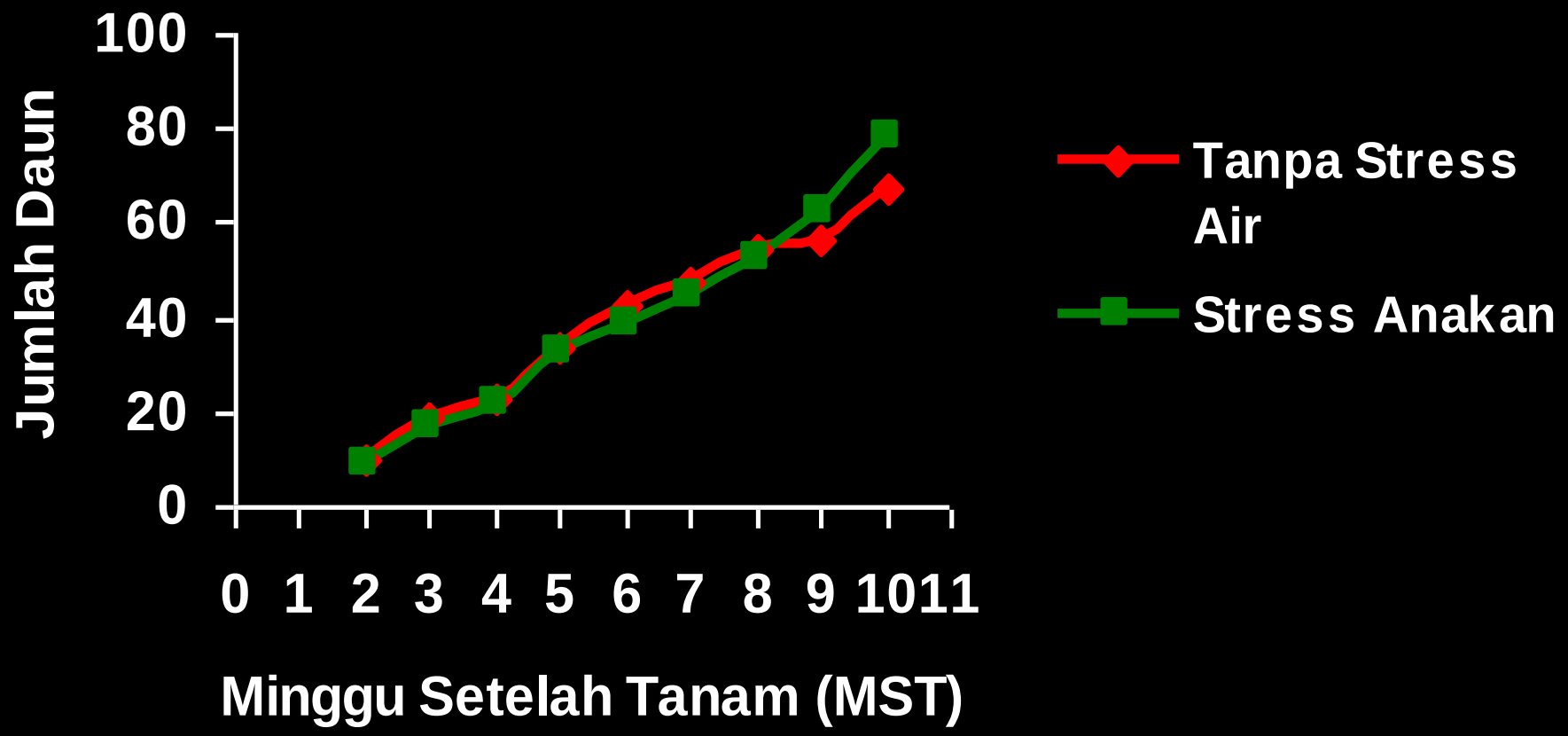
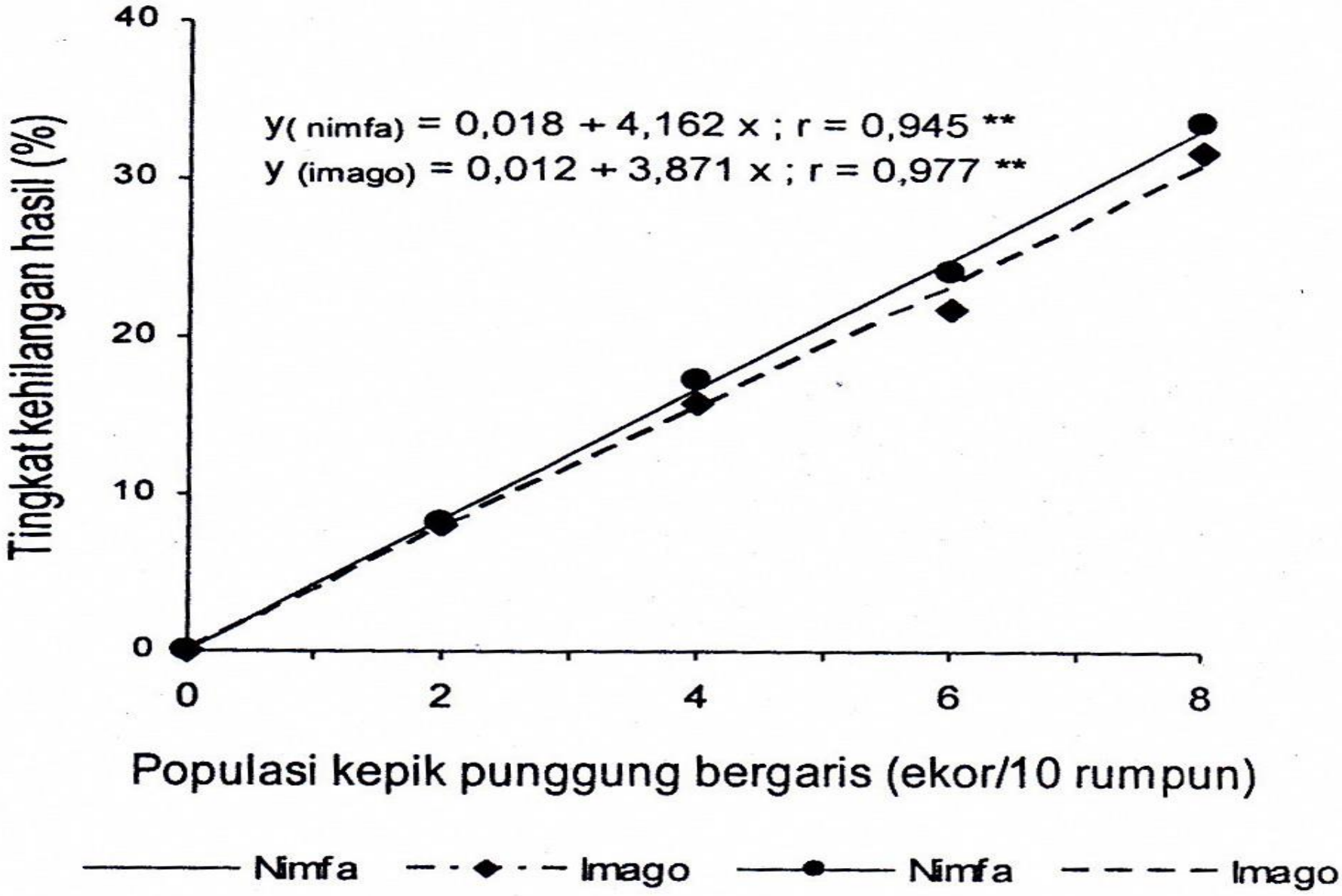


Figure 6. Primary growth (stem height) of White pines at two sites near Lake Auburn, Maine, based upon random samples of trees using transect methods ('93 and '94) and point plot surveys ('95 and '96). Error bar=SEM. Minimum sample size was 43 trees (Water District '95).

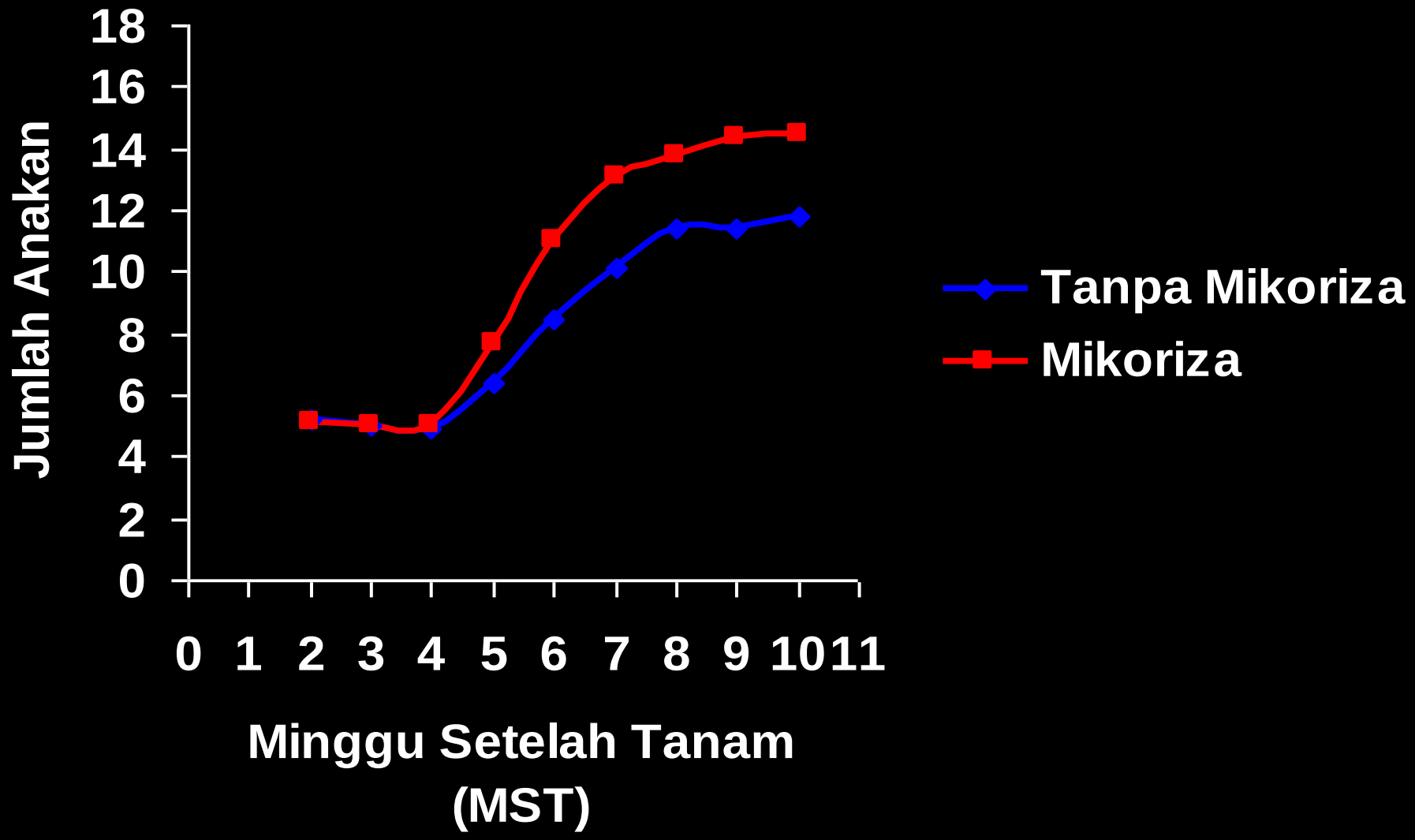
Pengaruh Stress Air Terhadap Jumlah Daun





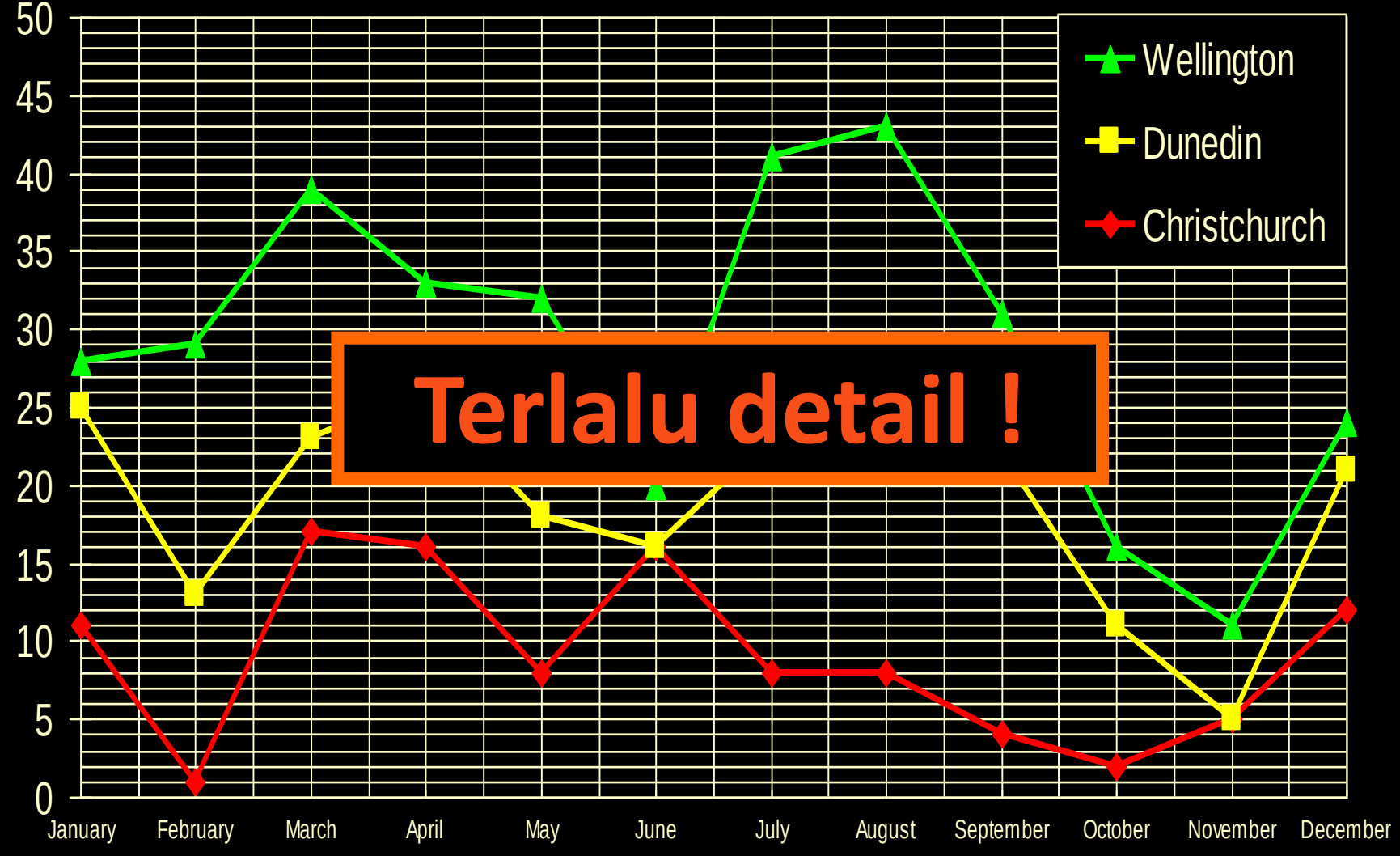
Gambar 1. Hubungan antara populasi kepik punggung bergaris stadia nimfa dan imago dengan tingkat kehilangan hasil pada tanaman kedelai varietas Wilis umur 42-70 HST

Pengaruh Mikoriza Terhadap Jumlah Anakan Padi

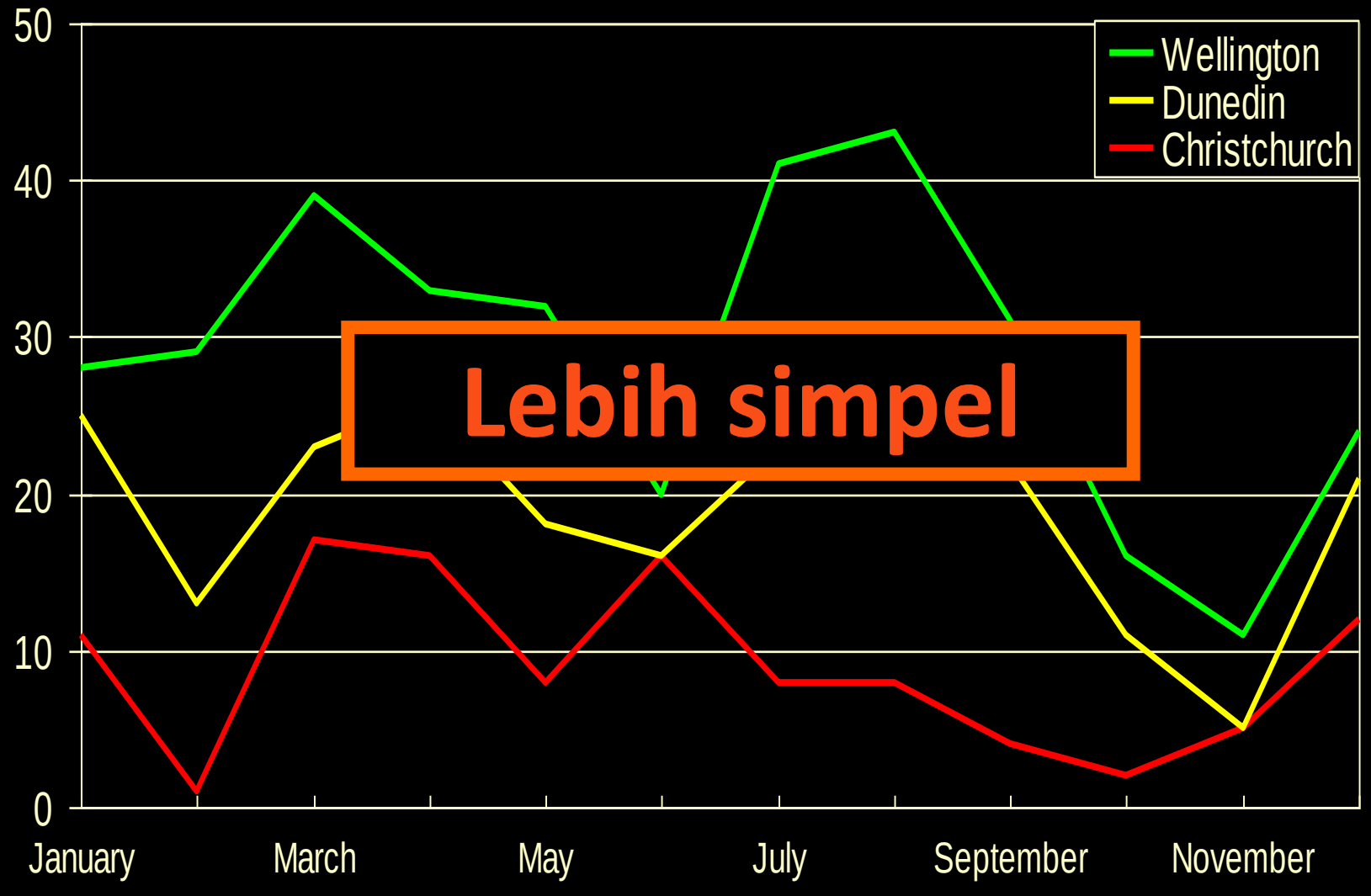


Grafik tidak boleh rumit

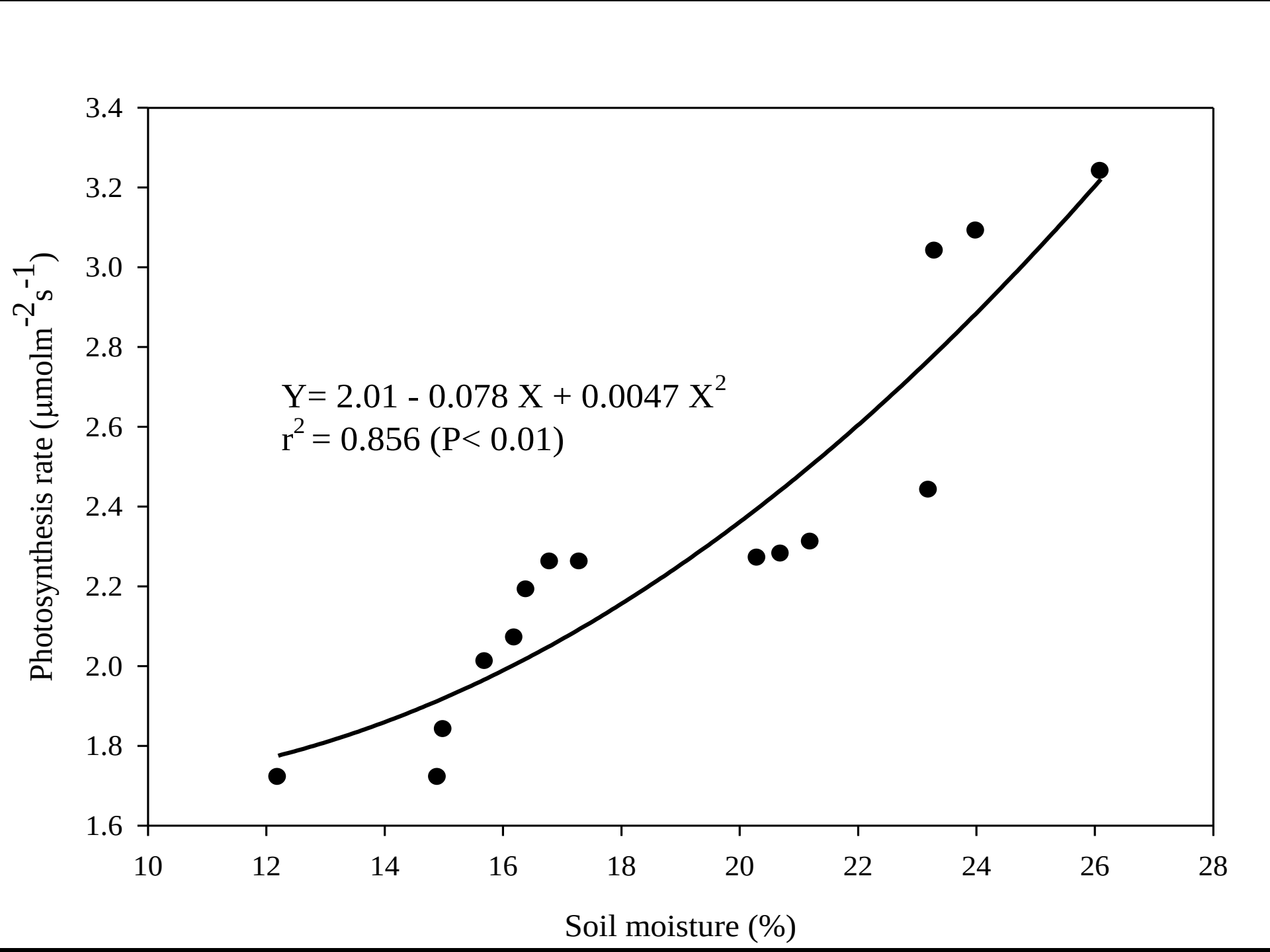
Daun Gugur


50
45
40
35
30
25
20
15
10
5
0
January
February
March
April
May
June
July
August
September
October
November
December
Wellington
Dunedin
Christchurch
Terlalu detail !

Daun gugur


50
40
30
20
10
0
January
March
May
July
September
November
Wellington
Dunedin
Christchurch
Lebih simpel

Soil Moisture (%)	Photosynthesis (micromol/m2/s)
26.10	**3.24**
24.00	**3.09**
23.30	**3.04**
23.20	**2.44**
21.20	**2.31**
20.70	**2.28**
20.30	**2.27**
17.30	**2.26**
16.80	**2.26**
16.40	**2.19**
16.20	**2.07**
15.70	**2.01**
15.00	**1.84**
14.90	**1.72**
12.20	**1.72**


3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
Photosynthesis rate (μmolm-2s-1)
Y= 2.01 - 0.078 X + 0.0047 X2
r2 = 0.856 (P< 0.01)
10
12
14
16
18
20
22
24
26
28
Soil moisture (%)

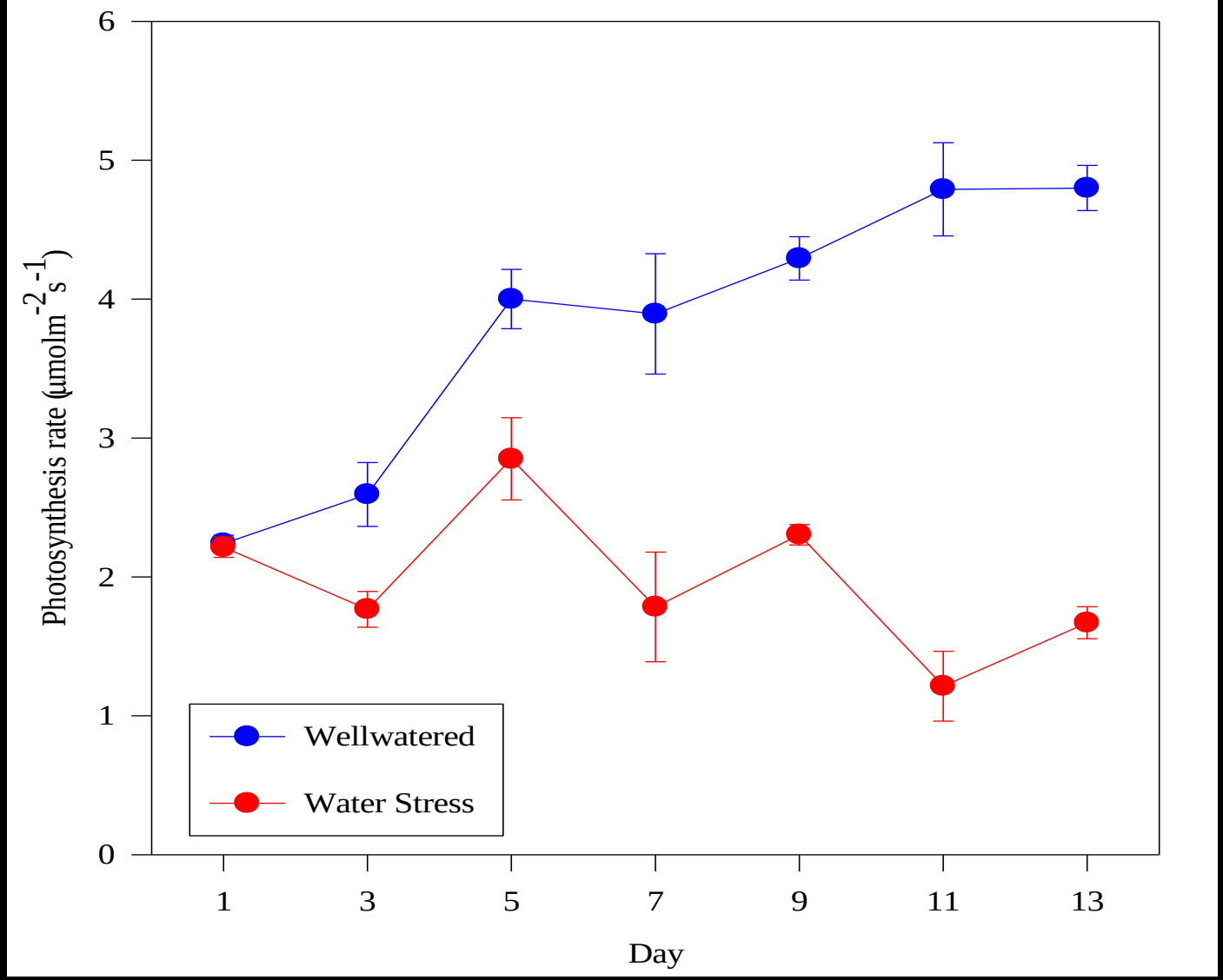
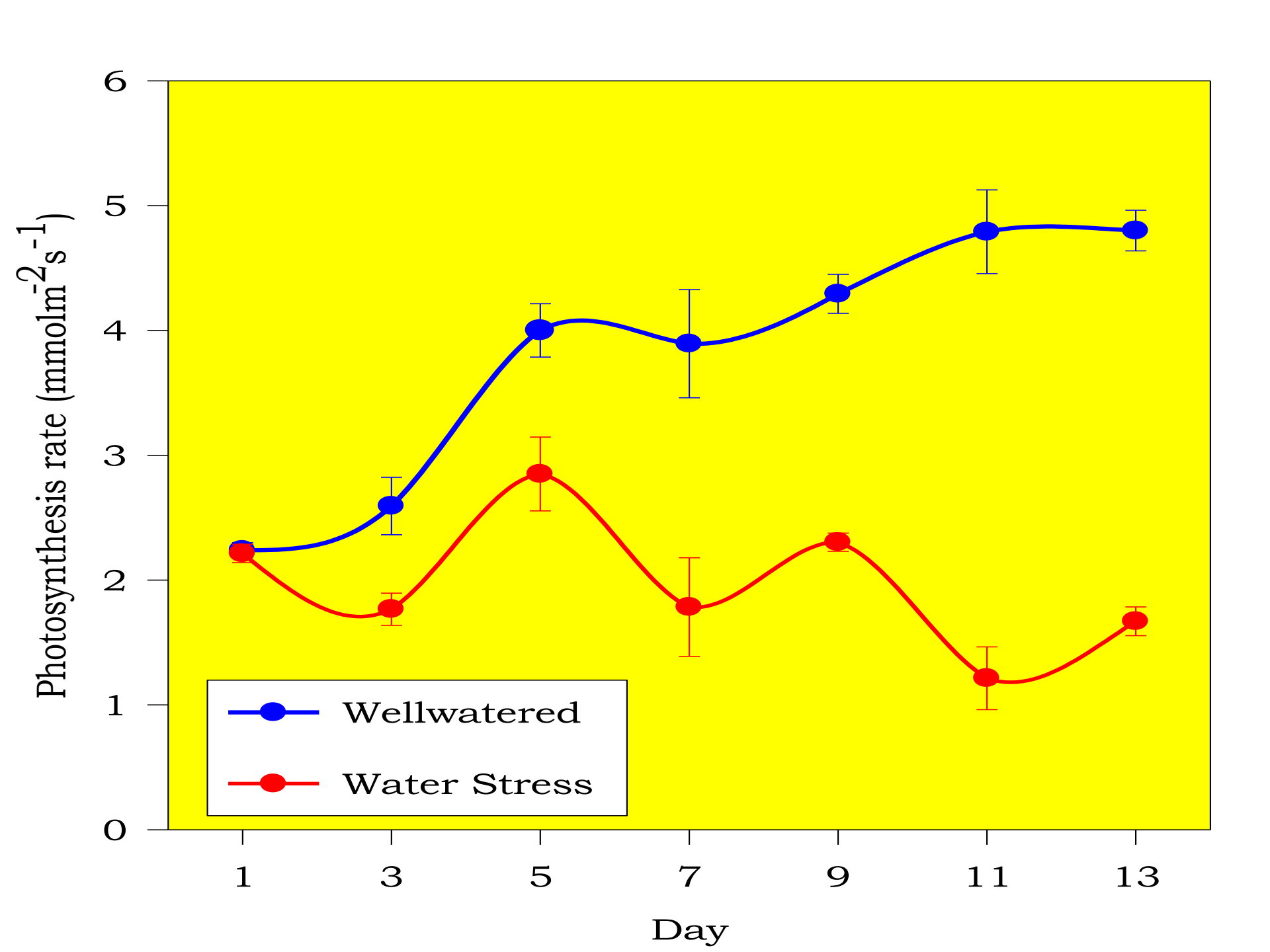
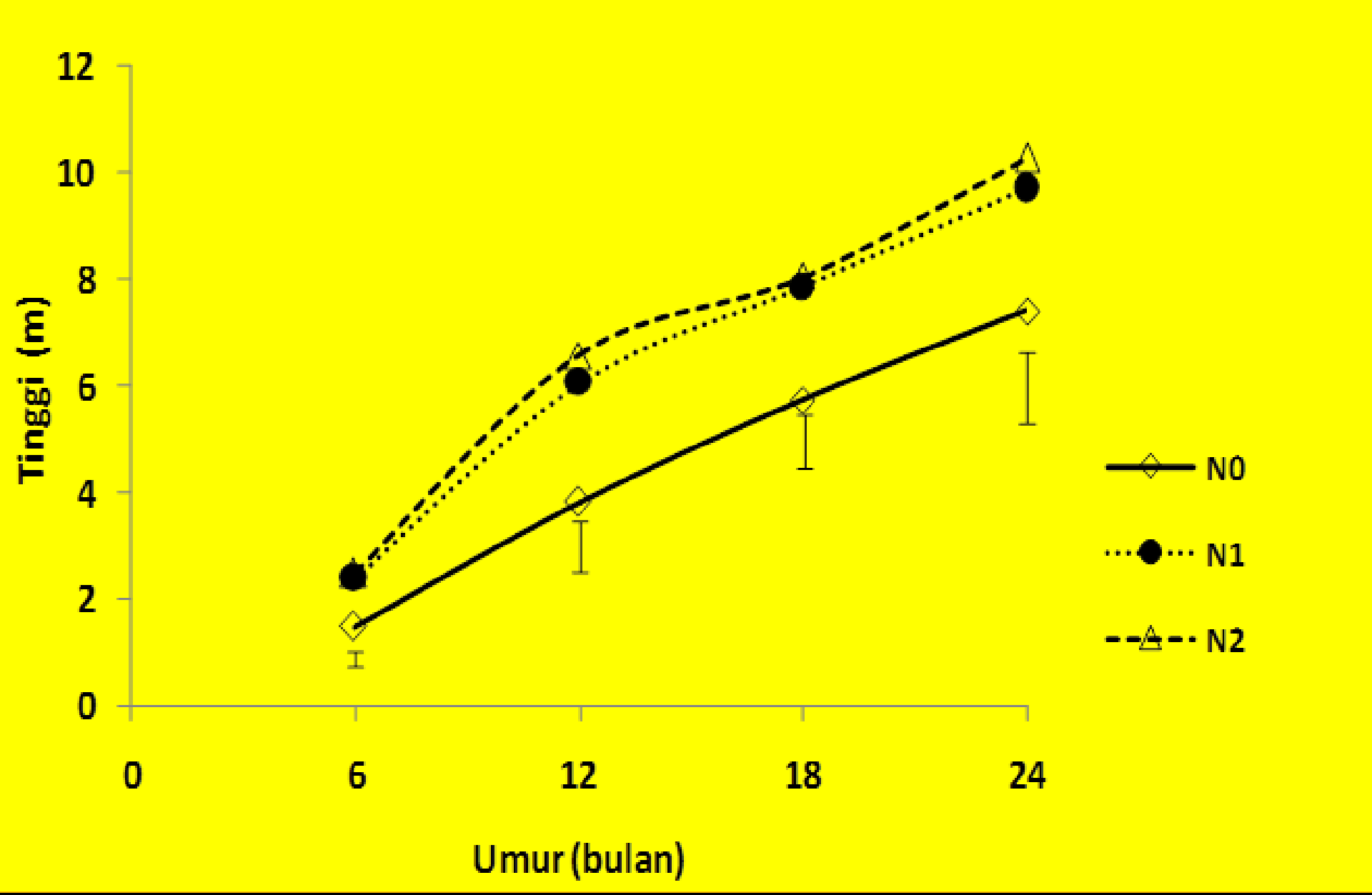
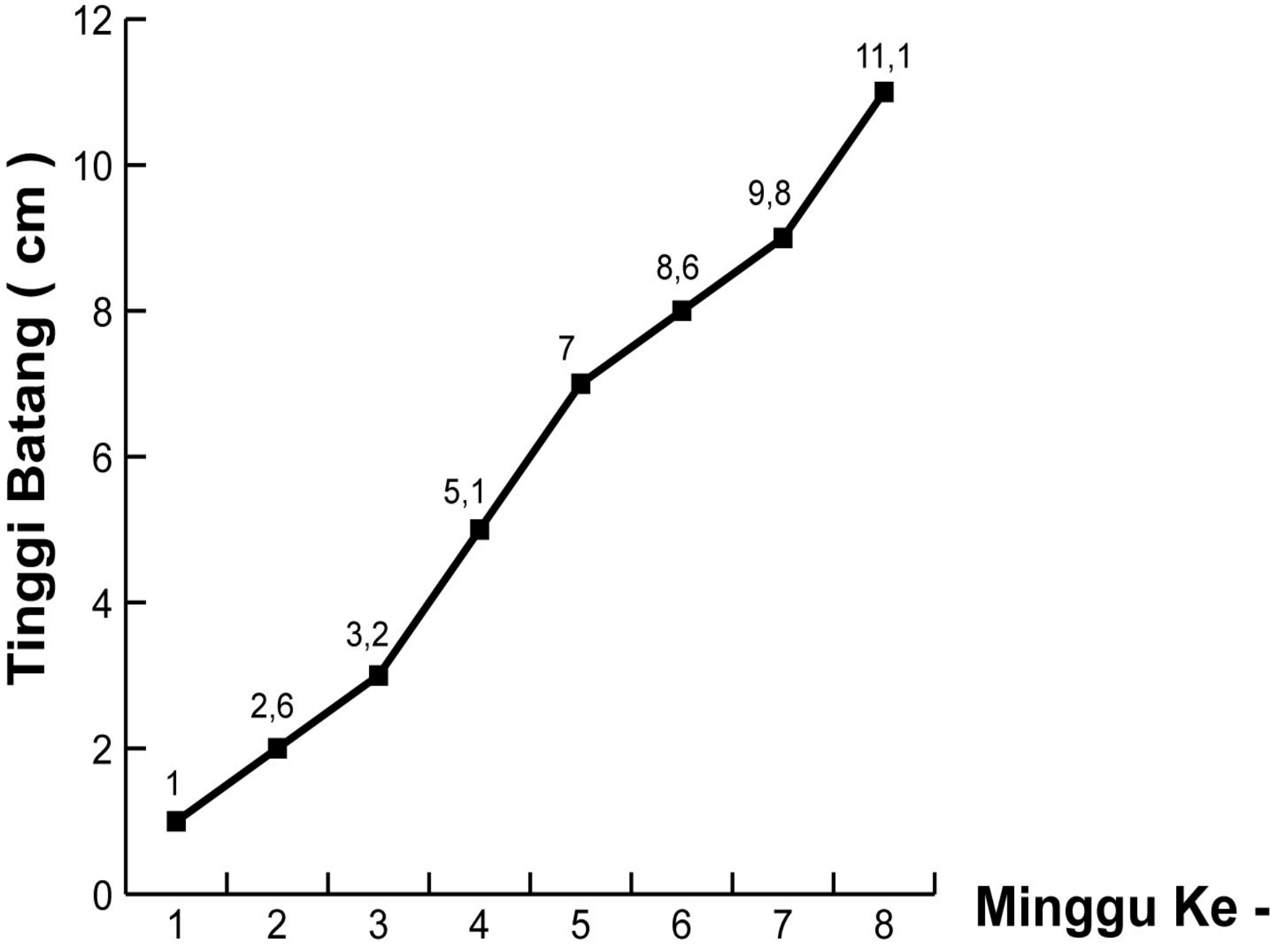


Figure 4.4 Photosynthesis rate of mangosteen under well-watered and water stress. WW = Well-watered, WS= Water stressed. Bar represent Standard error (n=9).


Photosynthesis rate (mmolm-2s-1)
0
1
2
3
4
5
6
1
3
5
7
9
11
13
Day
Wellwatered
Water Stress



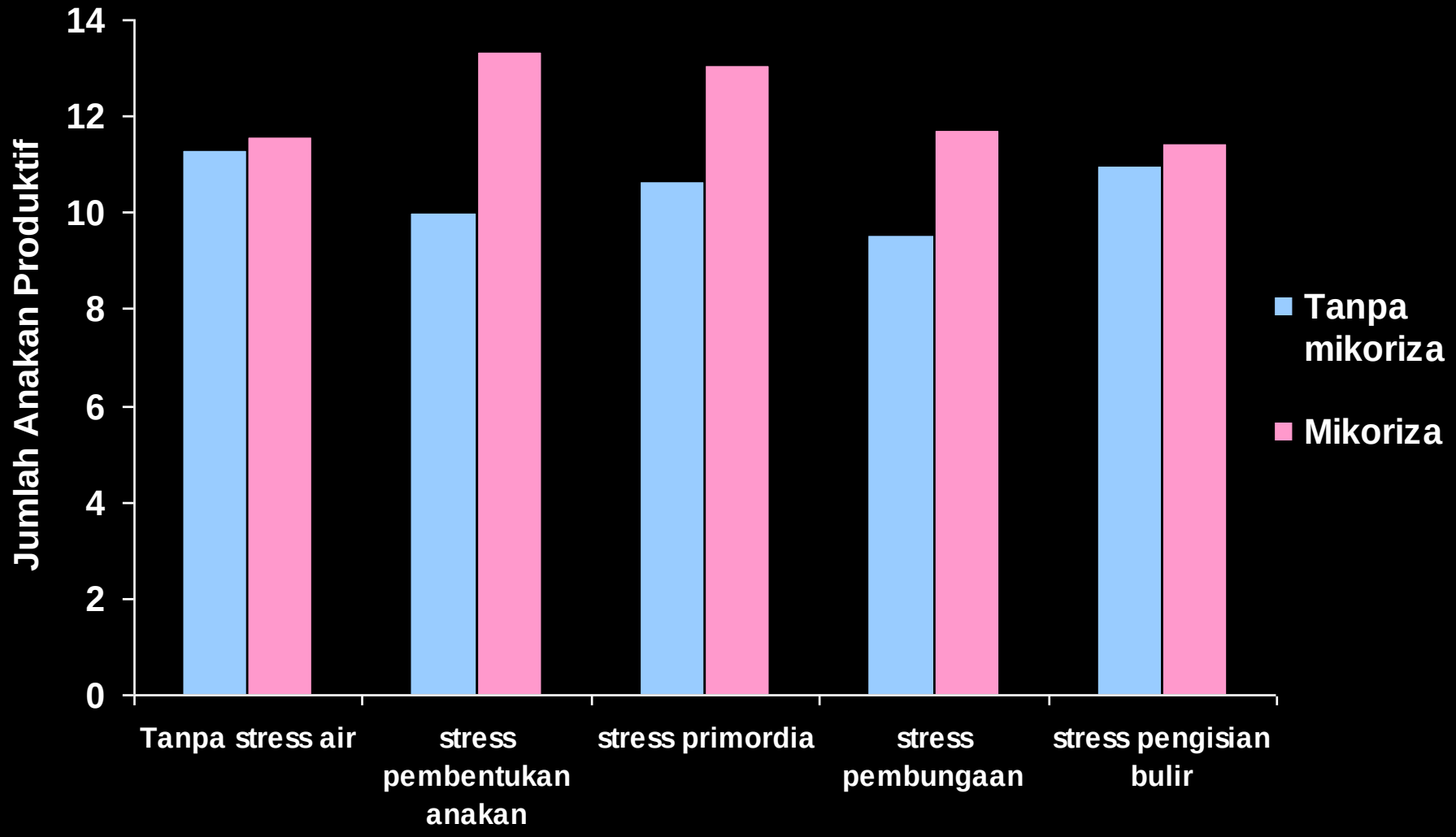
Gambar 4. (A) Pengaruh pemupukan pada tinggi tanaman EH. Garis bar vertikal dalam grafik adalah BNT(0.05) antar perlakuan pada umur pengukuran


Tinggi Batang (cm)
12
10
8
6
4
2
0
1
2,6
3,2
5,1
7
8,6
9,8
11,1
1
2
3
4
5
6
7
8
Minggu Ke -

Grafik Batang (Bar chart)

- Grafik batang biasanya digunakan untuk menggambarkan data atau informasi pada satu saat tertentu.
- Data yang digunakan adalah data diskret (bukan data kontinu)

Pengaruh Interaksi Stress Air dan Mikoriza Terhadap Jumlah Anakan Produktif Padi



Bar Charts

- Biasanya untuk satu variabel
- Usahakan antar “bar” berjarak, agar mudah dilihat.
- Boleh menyertakan ‘hasil uji lanjut”

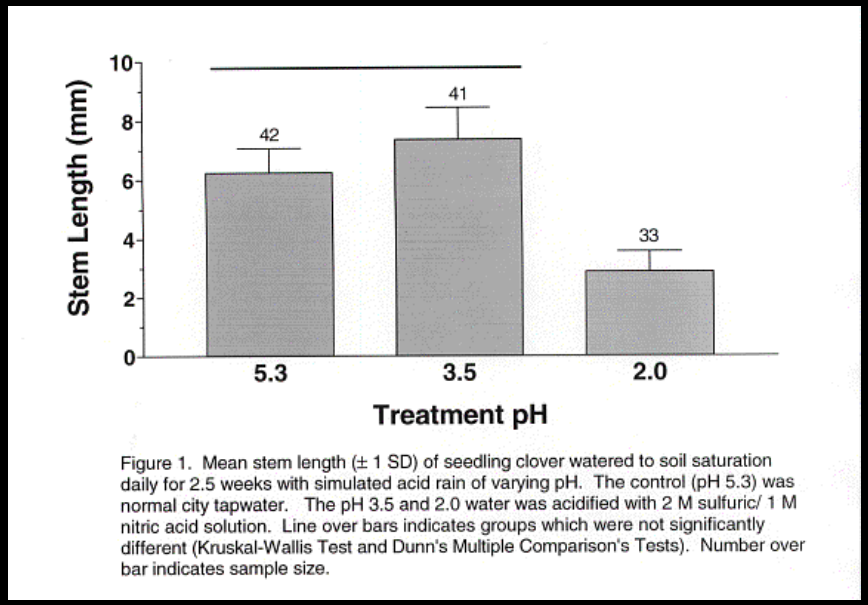
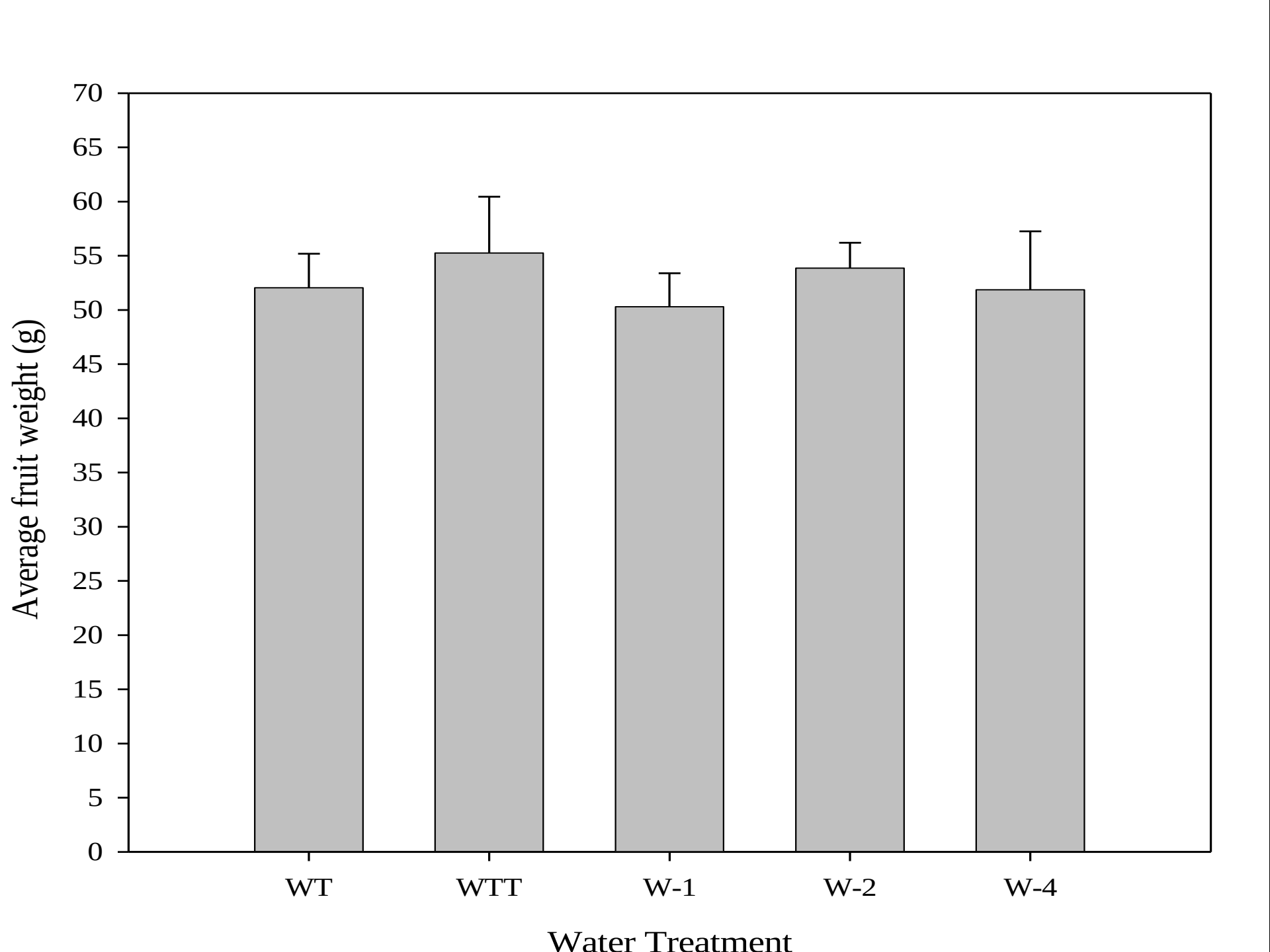


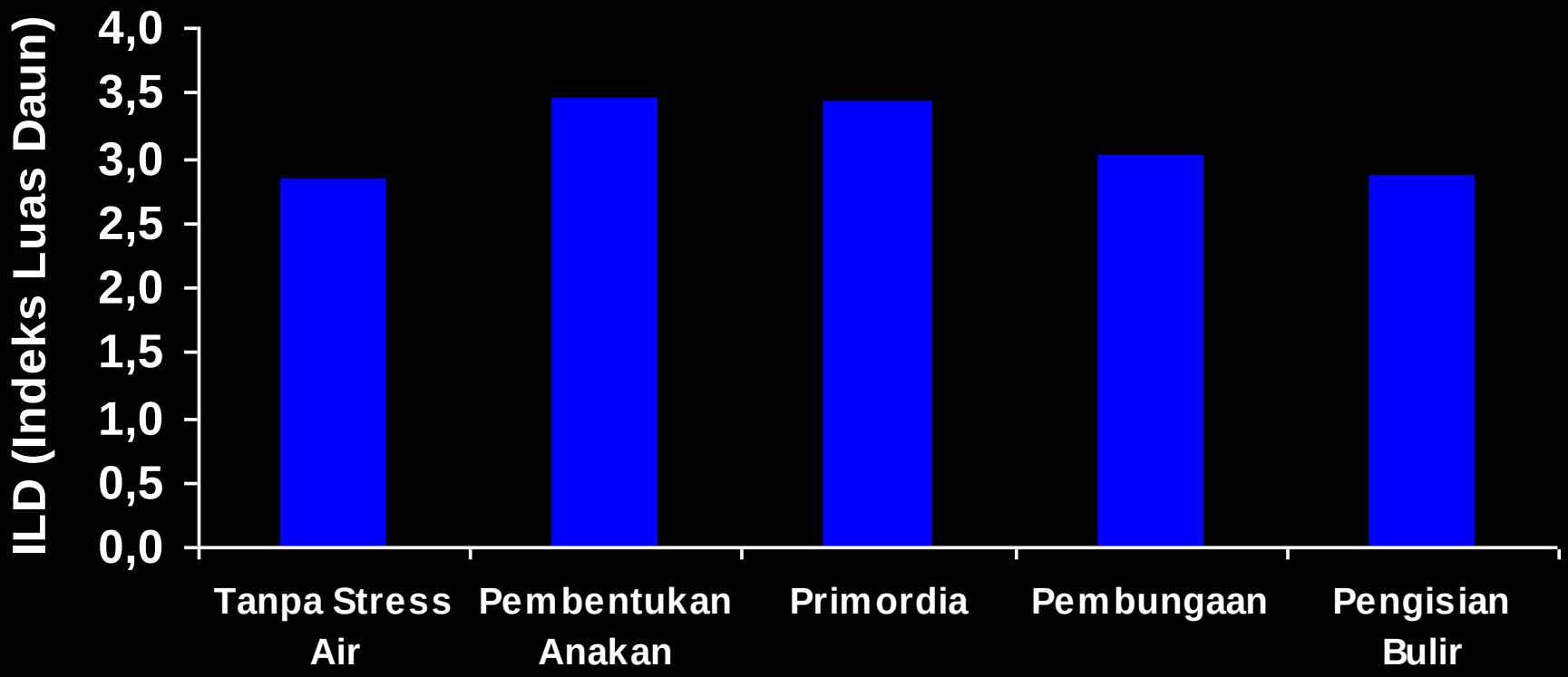
Figure 1. Mean stem length (± 1 SD) of seedling clover watered to soil saturation daily for 2.5 weeks with simulated acid rain of varying pH. The control (pH 5.3) was normal city tapwater. The pH 3.5 and 2.0 water was acidified with 2 M sulfuric/ 1 M nitric acid solution. Line over bars indicates groups which were not significantly different (Kruskal-Wallis Test and Dunn's Multiple Comparison's Tests). Number over bar indicates sample size.

Average Fruit Weight (gram)

WS	W1	W4	WT	WTT	W-1	W-2	W-4
72.3	63.9	76.3	52.3	48.7	47.0	58.1	65.2
63.9	82.2	87.8	57.9	55.0	48.0	49.8	56.0
78.6	62.7	64.7	54.7	47.3	59.5	49.8	44.1
68.1	63.5	74.0	43.3	70.0	46.7	57.7	42.1


70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Average fruit weight (g)
WT
WTT
W-1
W-2
W-4
Water Treatment

Pengaruh Stress Air Terhadap ILD Tanaman Padi



Grafik skater/Scatter Plots

- Menyatakan hubungan dua variabel.
- Variabel Independen ditempatkan di sumbu X

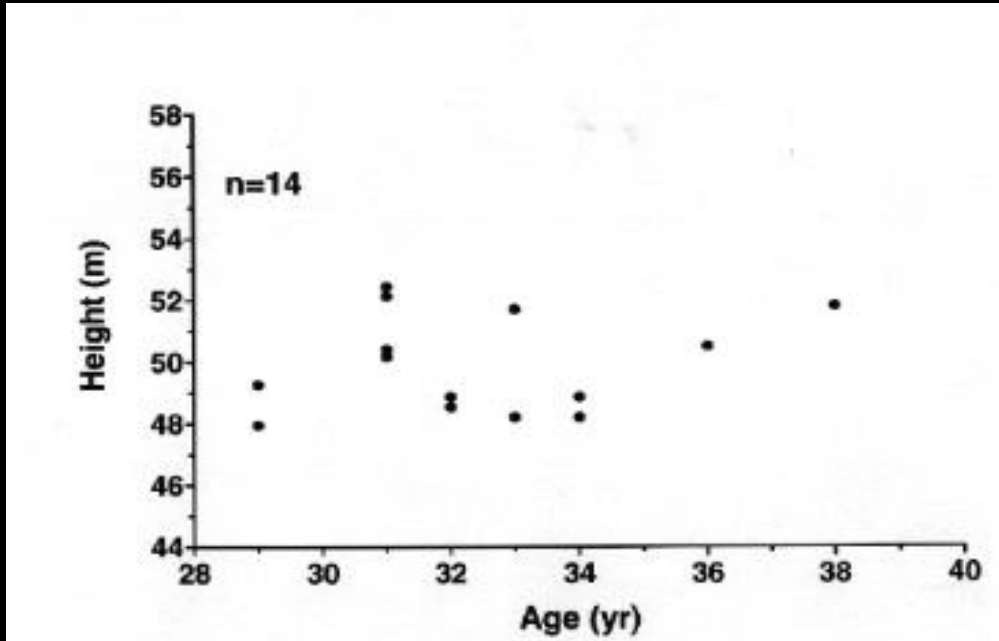
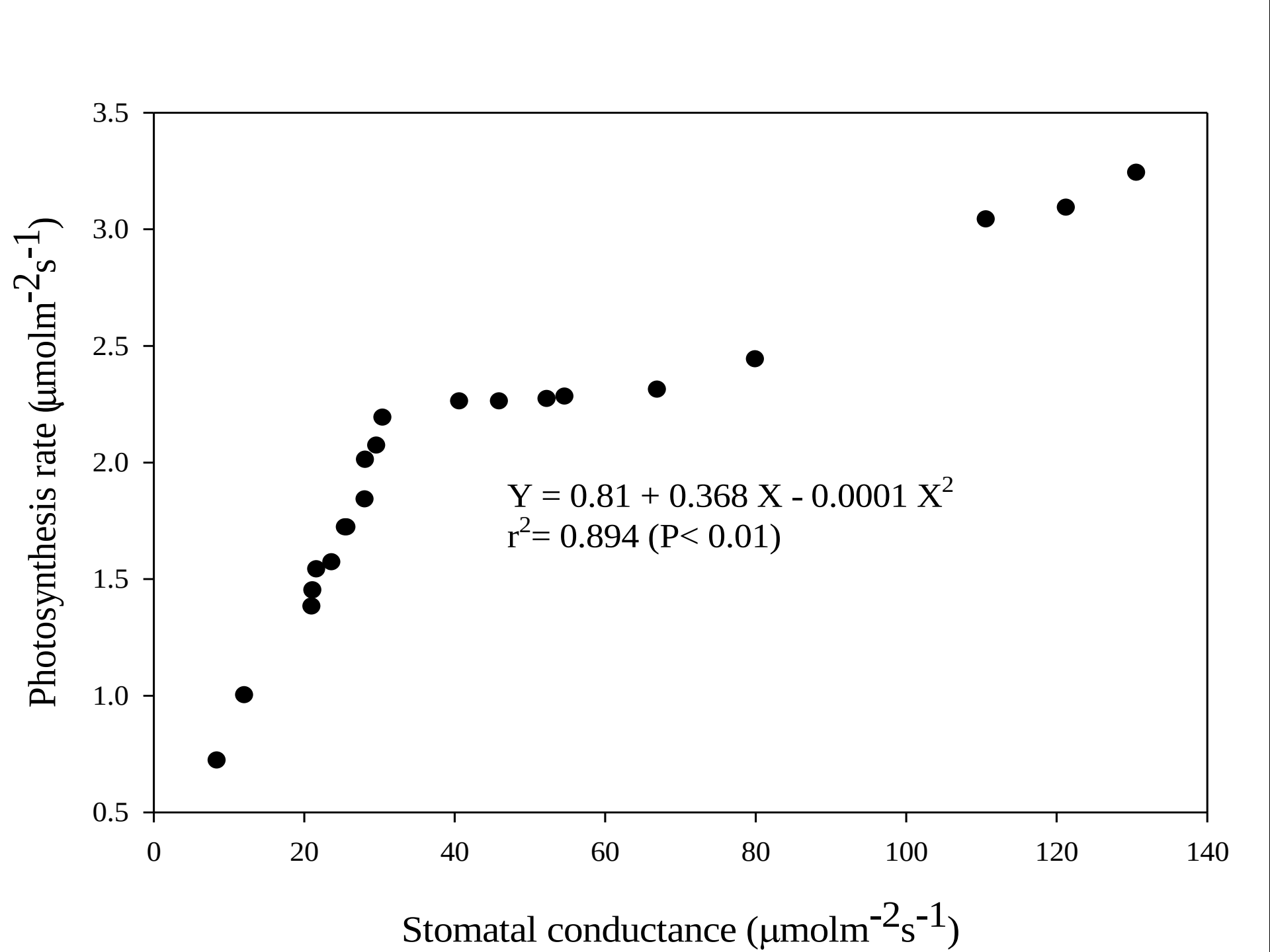
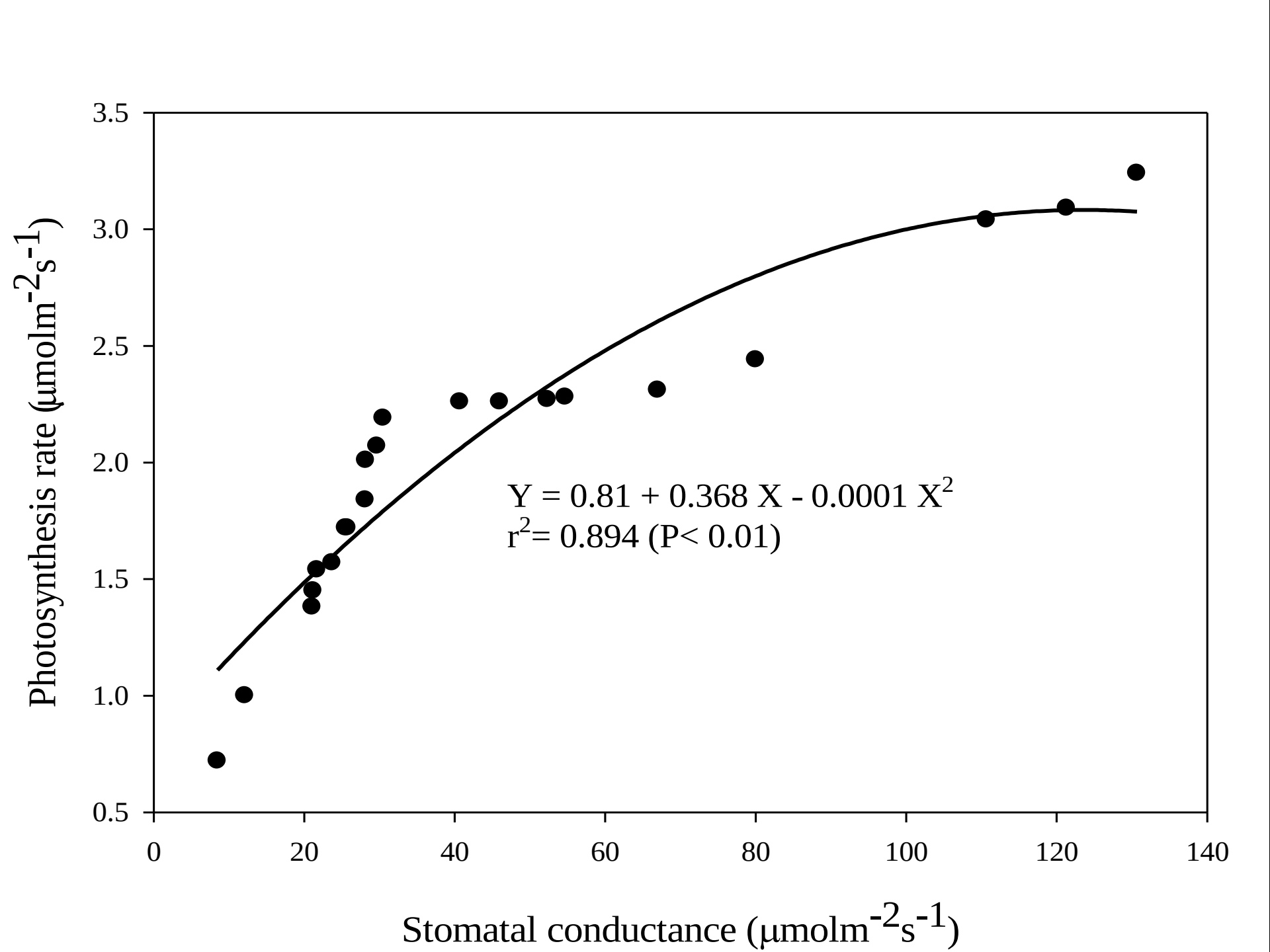


Figure 3. Age-height relationship of White pines (*Pinus strobus*) at the Lewiston-Auburn Water District site near Lake Auburn, Maine, in February, 1998. These fourteen trees were used to calculate the Site Index (height at age 50) based upon Lancaster and Leak (1984).

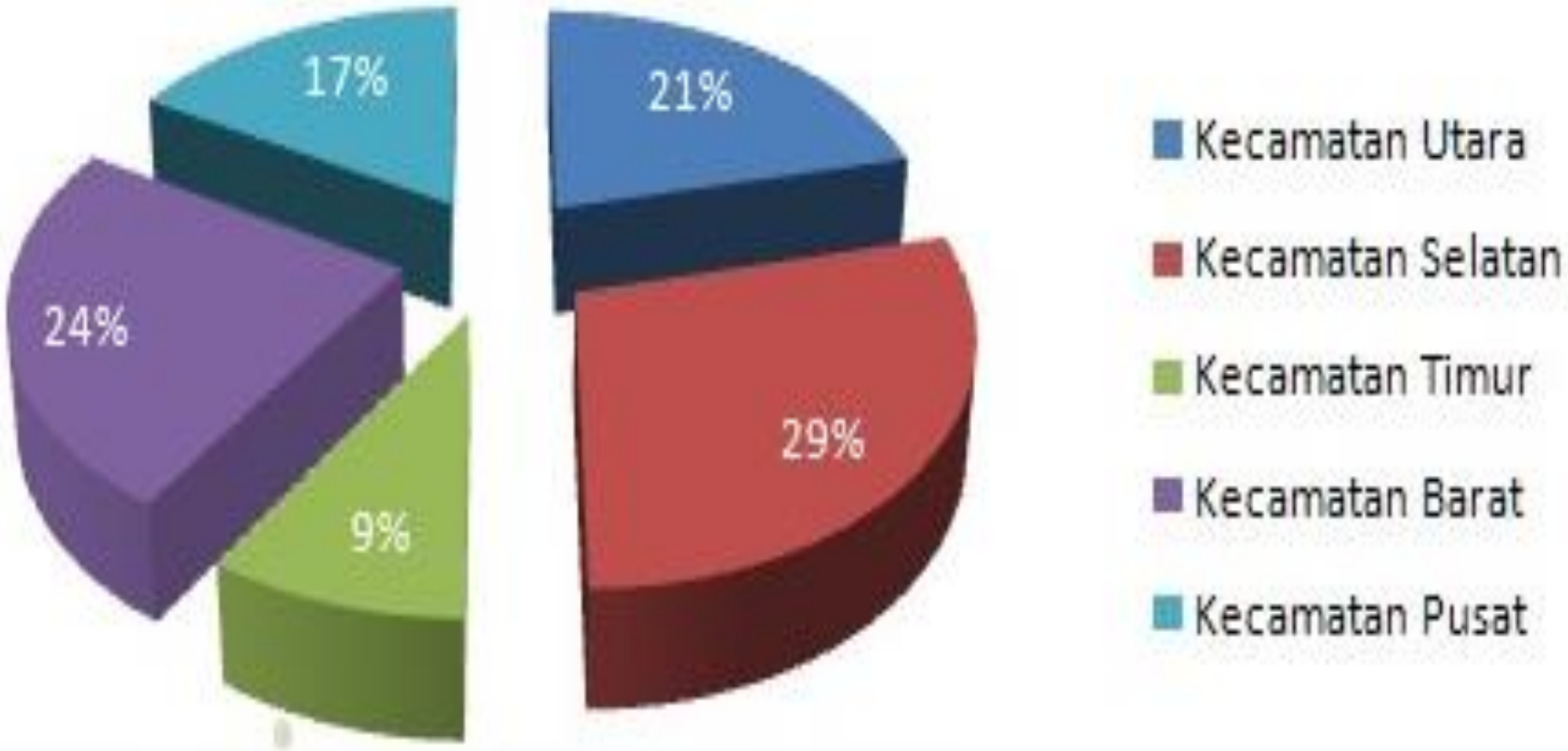

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140
Photosynthesis rate (μmolm-2s-1)
Stomatal conductance (μmolm-2s-1)
Y = 0.81 + 0.368 X - 0.0001 X2
r2= 0.894 (P< 0.01)

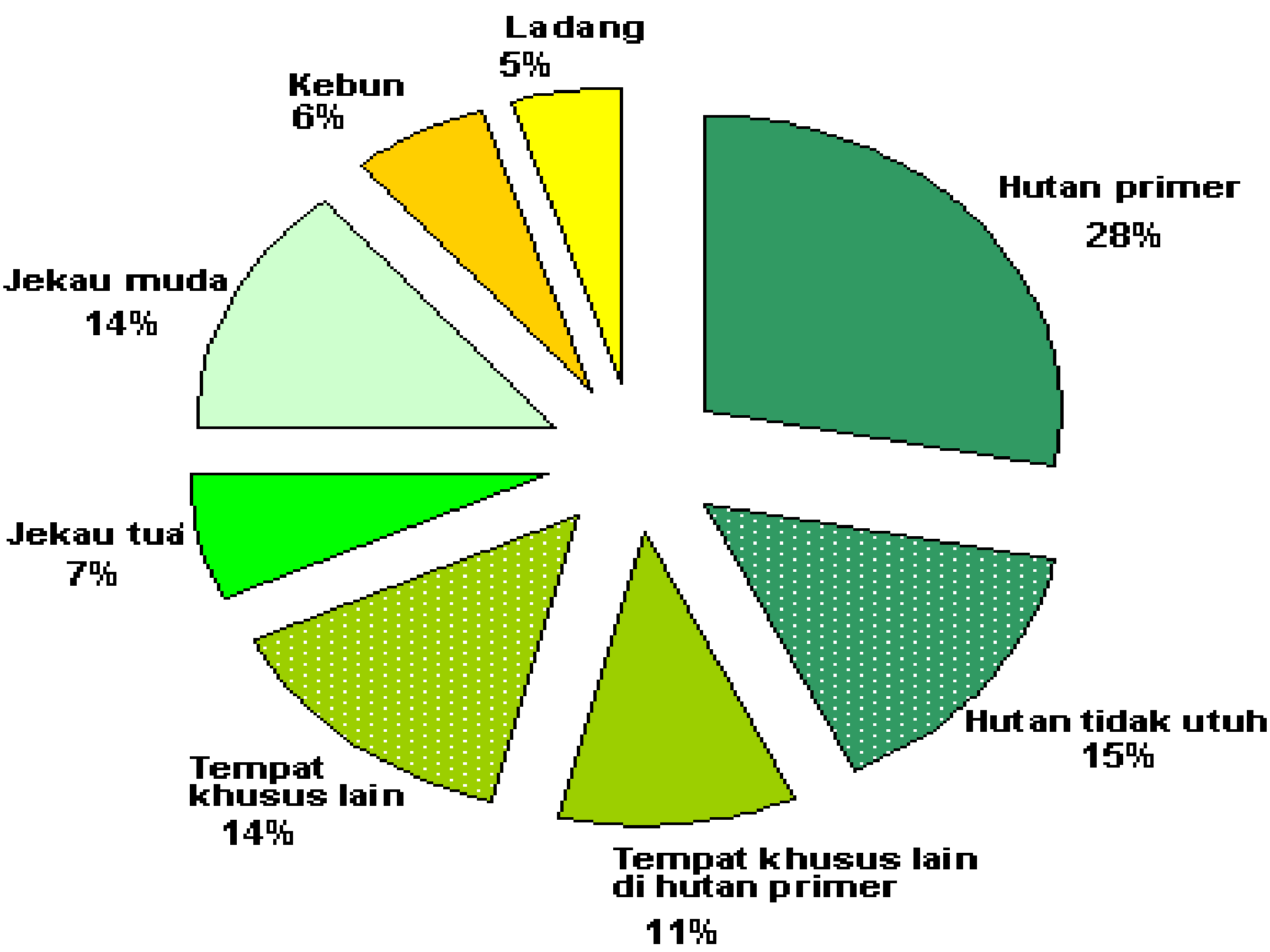

3.5
3.0
2.5
2.0
1.5
1.0
0.5
Photosynthesis rate (μmolm-2s-1)
0
20
40
60
80
100
120
140
Stomatal conductance (μmolm-2s-1)
Y = 0.81 + 0.368 X - 0.0001 X2
r2= 0.894 (P< 0.01)

Grafik Pie (kue)

- Grafik Pie berfungsi untuk menampilkan data dan infromasi dalam bentuk juring lingkaran.
- Kegunaan grafik ini hamir sama dengan tipe batang.
- Grafik pie memiliki keunggulan yaitu dapat menampilkan perbandingan data dalam bentuk persentase.

Jumlah Penduduk Per Kecamatan Tahun 2012




Ladang
5%
Kebun
6%
Hutan primer
28%
Jekau muda
14%
Jekau tua
7%
Hutan tidak utuh
15%
Tempat
khusus lain
14%
Tempat khusus lain
di hutan primer
11%

Diagram

Diagram

- Diagram adalah suatu ***representasi*** simbolis informasi dalam bentuk geometri dua dimensi sesuai teknik visualisasi.
- Kadang teknik yang dipakai memanfaatkan visualisasi tiga dimensi yang kemudian diproyeksikan ke permukaan dua dimensi.
- Kata grafik biasa dipakai sebagai sinonim kata diagram.

- Diagram berbasis grafik:

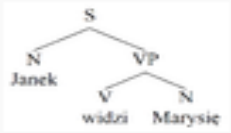


diagram pohon

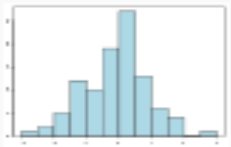
diagram jaringan

carta arus

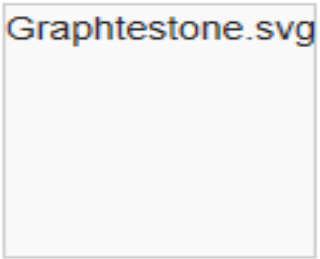
Diagram Venn

grafik eksistensial

- Teknik diagram mirip carta



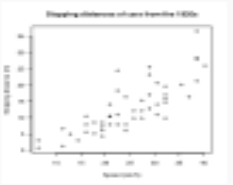
histogram



carta batang

carta pai

grafik fungsi



plot sebar

- Jenis diagram lain:

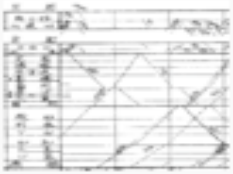
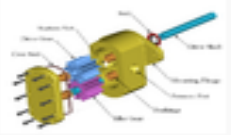


diagram kereta



grafis ledakan

peta kepadatan penduduk

Plakat Pioneer

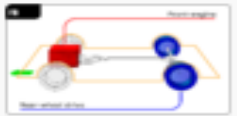
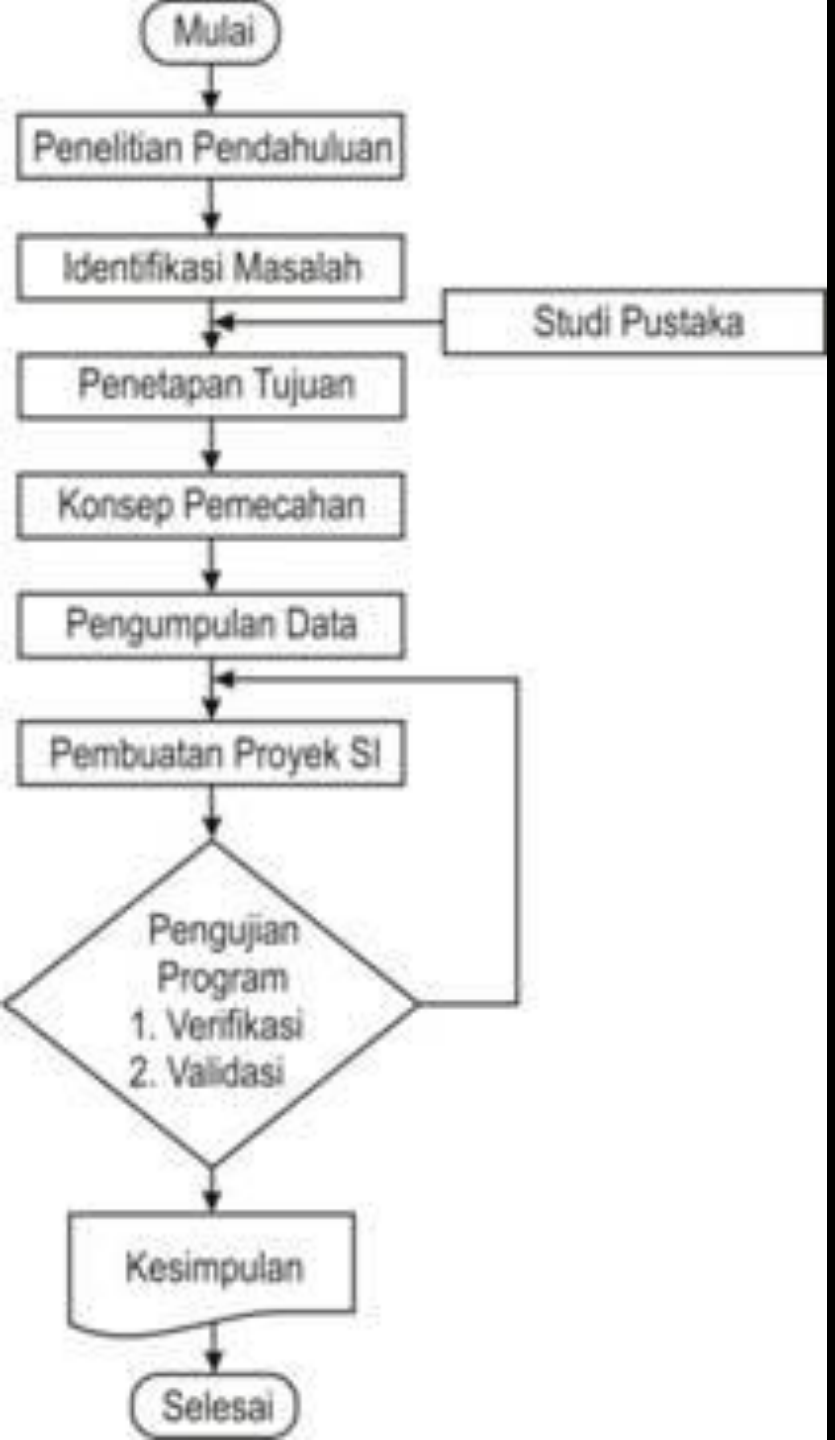
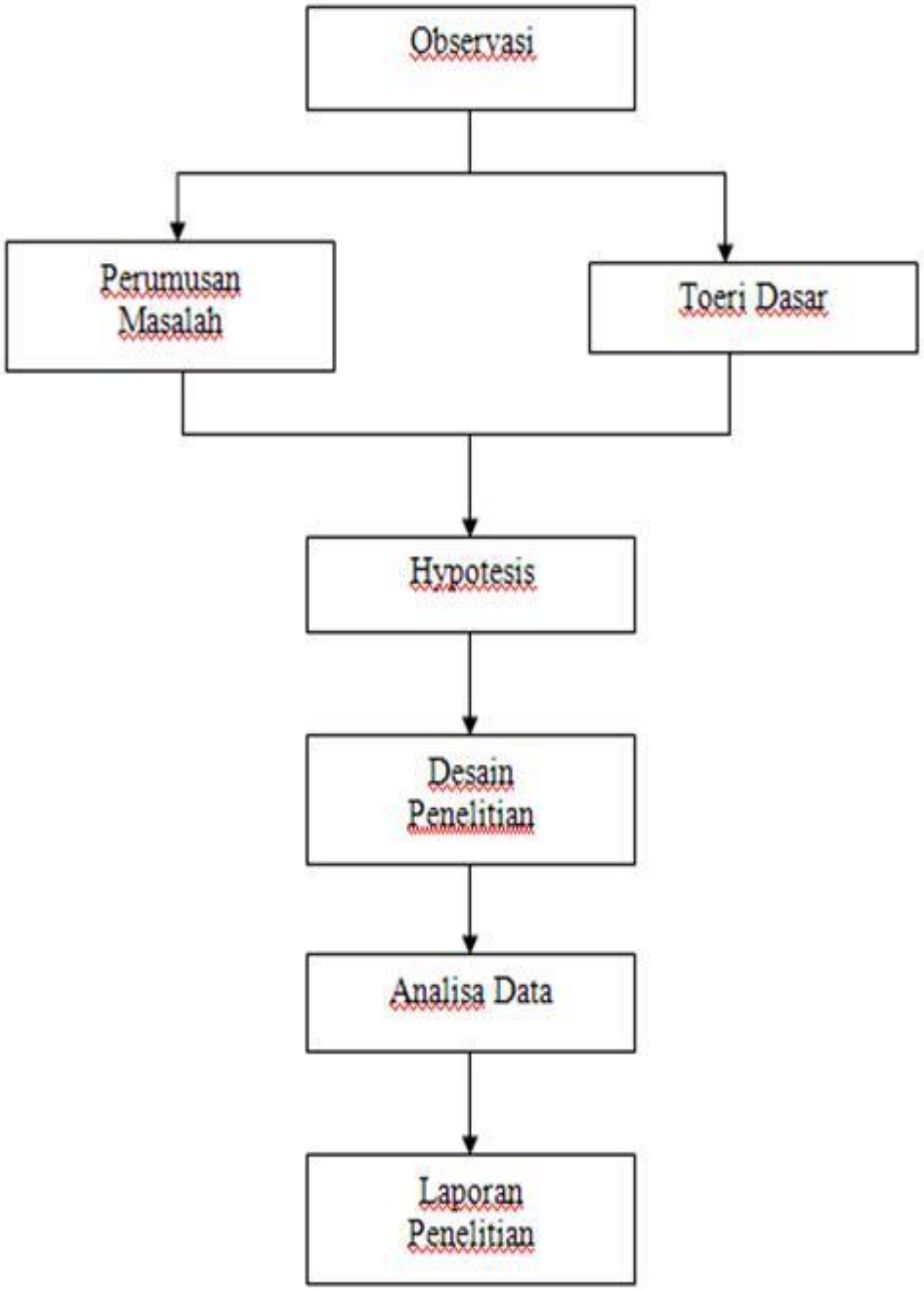


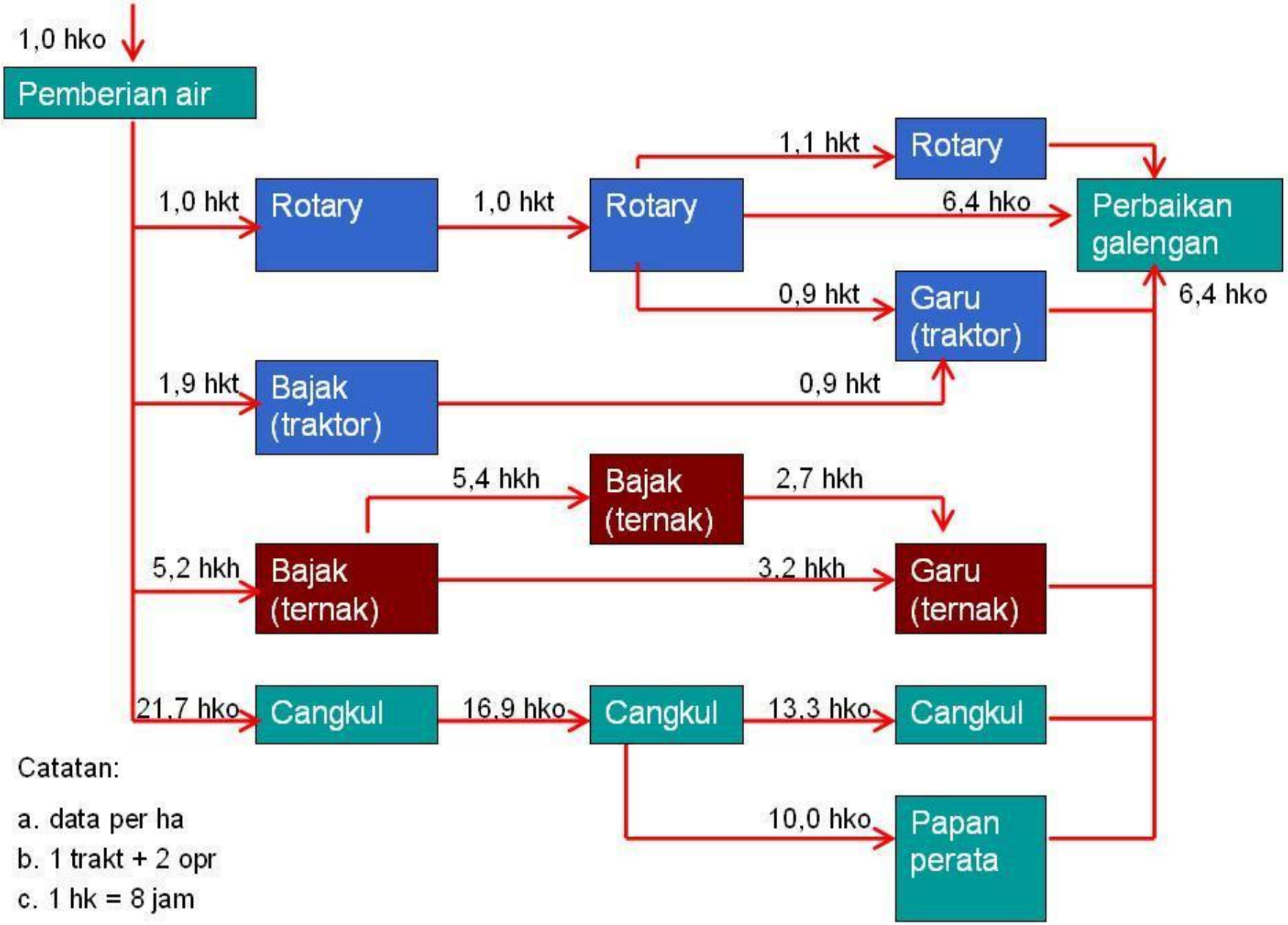
diagram tiga dimensi





Gambar 3.1. Bagan Rancangan Penelitian

Hasil Survey Pengolahan Tanah di Jabar (Pudjiono, 1981)



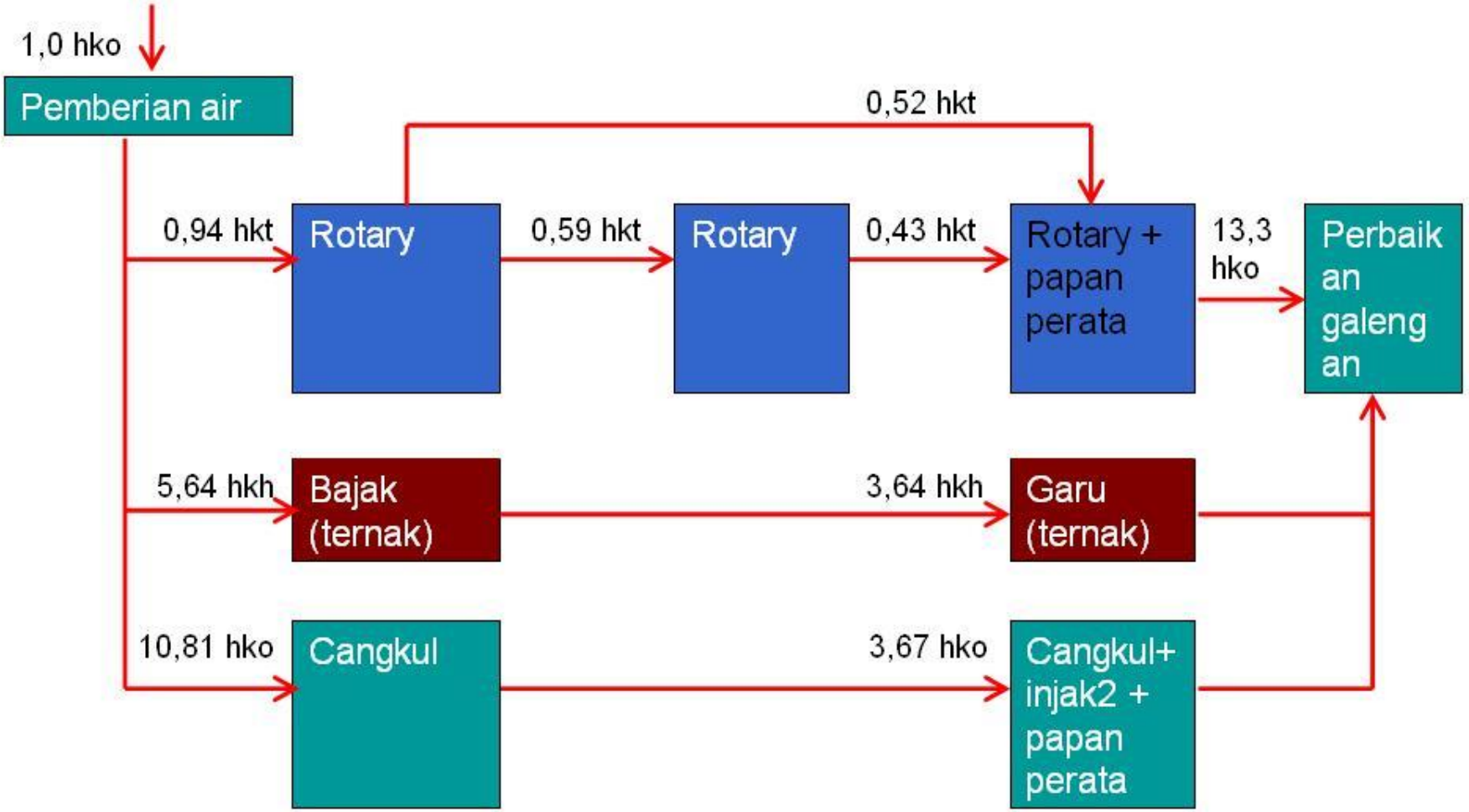
Catatan:

a. data per ha

b. 1 trakt + 2 opr

c. 1 hk = 8 jam

Hasil Percobaan Pengolahan Tanah di Jabar (Pudjiono, 1981)



Catatan:

a. data per ha

b. 1 trakt + 2 opr

c. 1 hk = 8 jam

Tangkai bunga/daun potong

Sortasi (pembuangan bagian rusak/cacat)

Holding (penyerapan larutan pengawet/ floraquit)

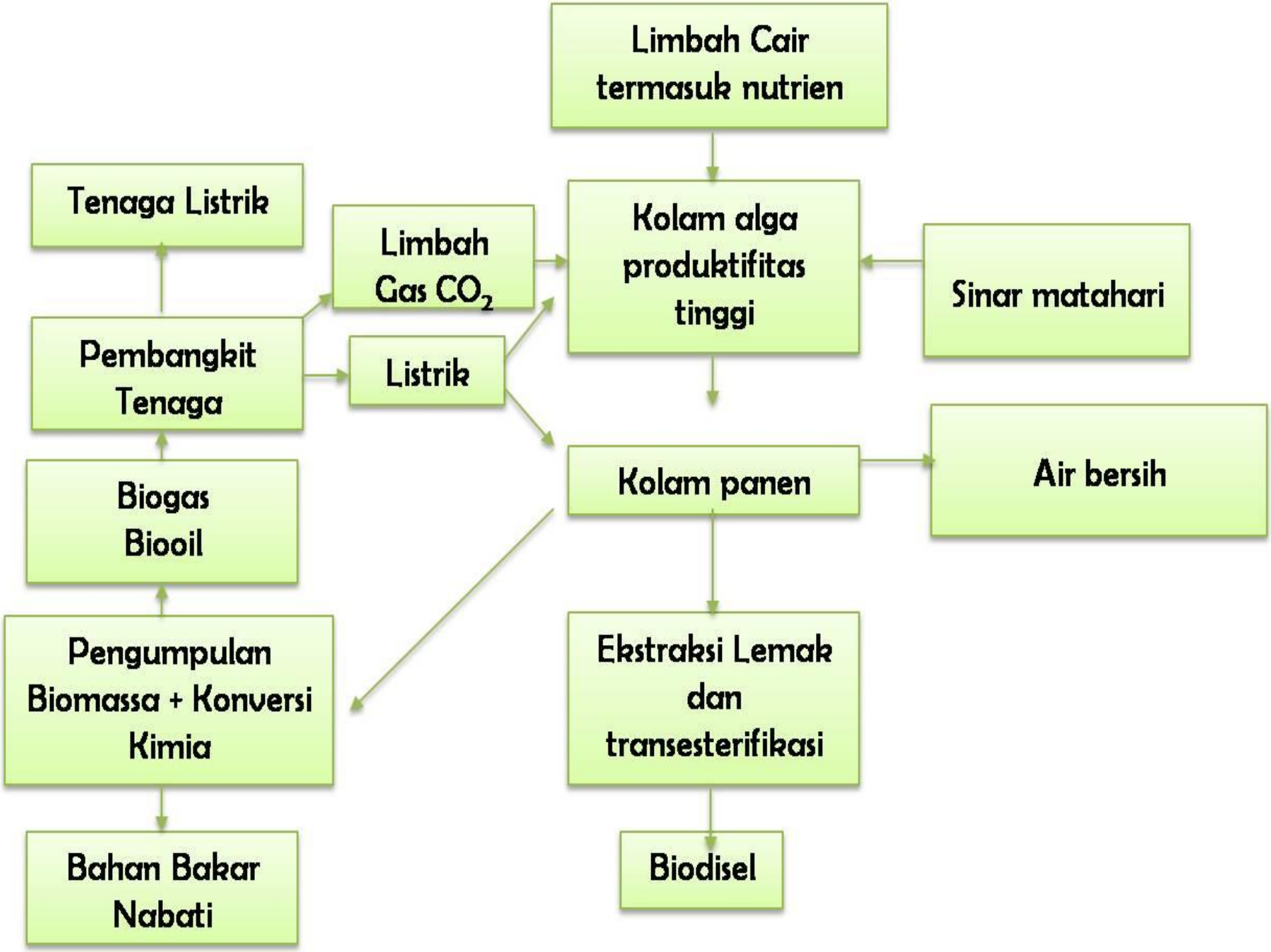
Pengeringan (50^0-70^0C;4-21 jam atau kering anginkan)

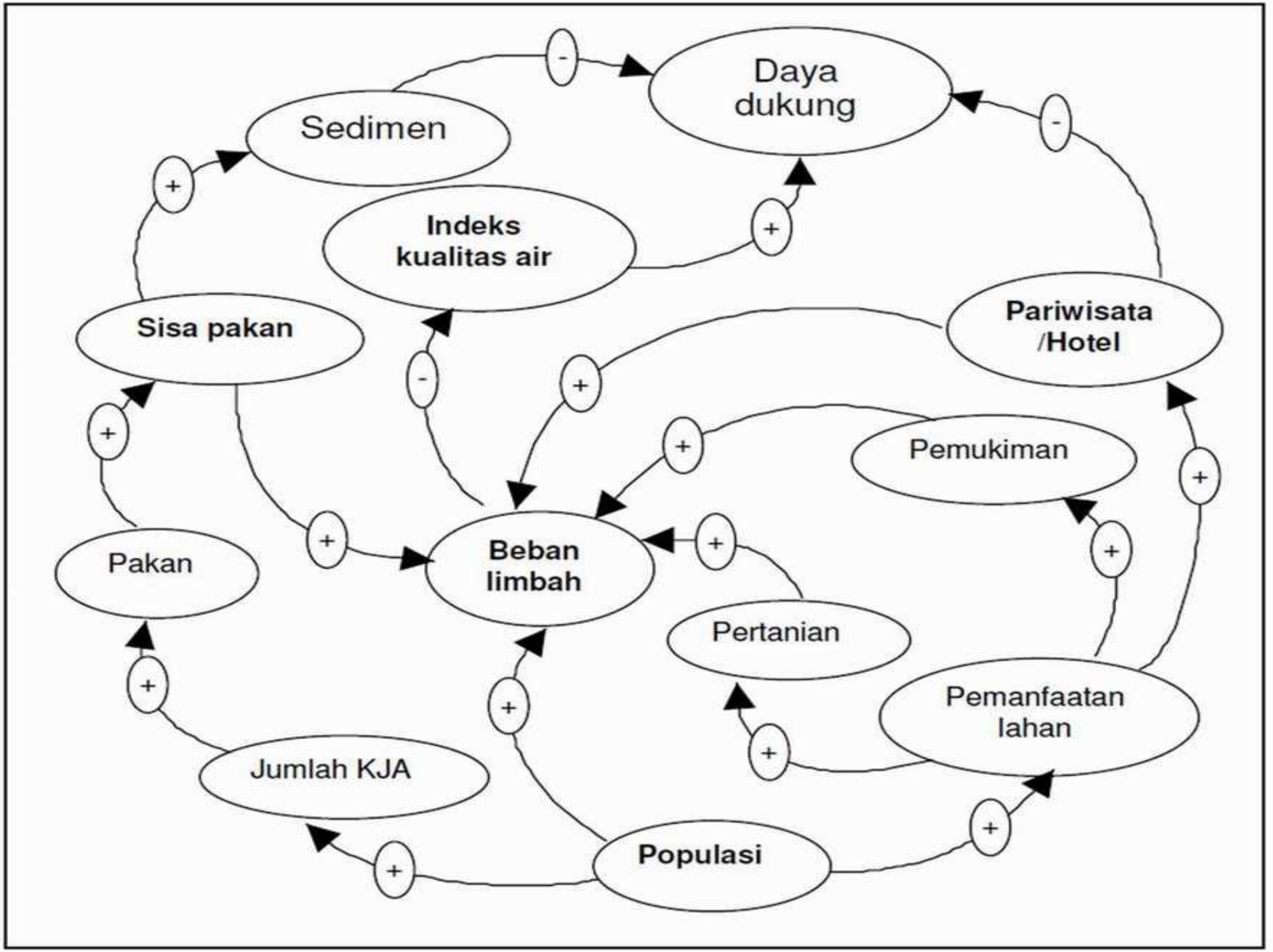
Pemantapan warna dan tekstur (ruang 20^0-25^0C)

Produk bunga/daun kering siap dibuat rangkaian

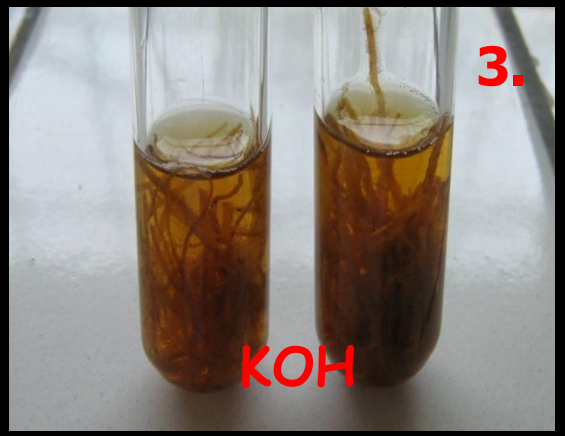
Rangkaian bunga kering jenis rumputan

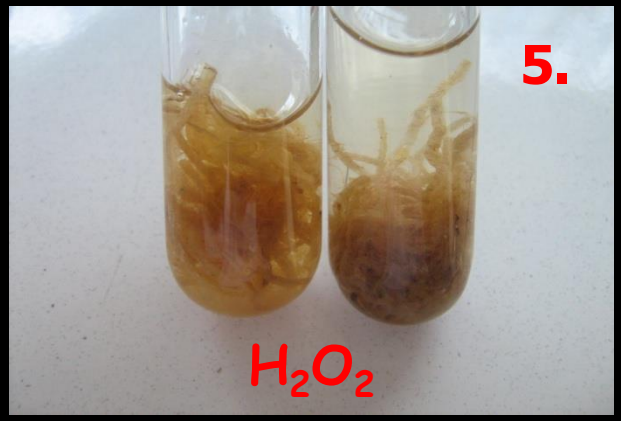
Rangkaian daun kering

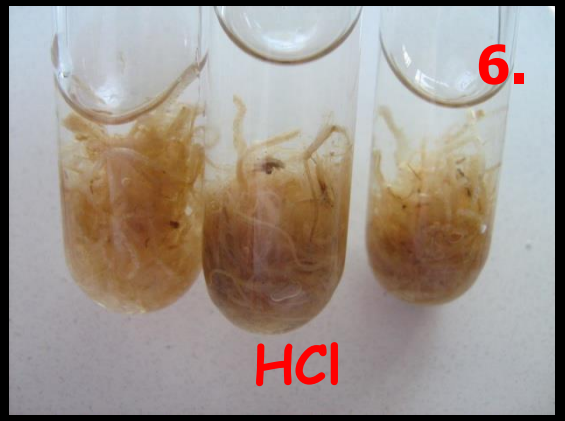

Limbah Cair termasuk nutrien
Tenaga Listrik
Limbah Gas CO_2
Kolam alga produktifitas tinggi
Sinar matahari
Pembangkit Tenaga
Listrik
Biogas Biooil
Kolam panen
Air bersih
Pengumpulan Biomassa + Konversi Kimia
Ekstraksi Lemak dan transesterifikasi
Bahan Bakar Nabati
Biodisel

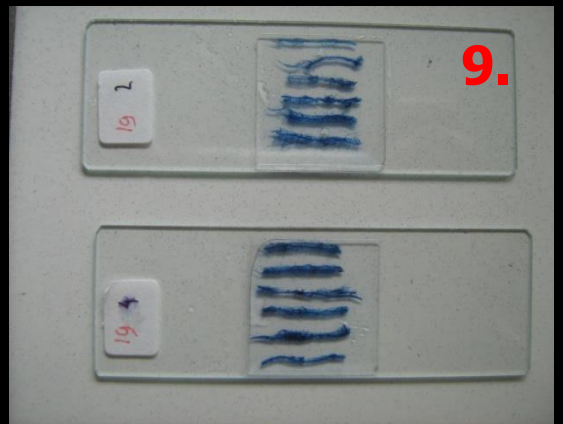

Daya dukung
Sedimen
Indeks kualitas air
Sisa pakan
Pariwisata /Hotel
Pemukiman
Pakan
Beban limbah
Pertanian
Pemanfaatan lahan
Jumlah KJA
Populasi
-
+
-
+
+
-
+
+
+
+
+
+
+
+
+
+
+

Metode Pewarnaan Akar









Masalah dalam penyajian hasil riset

- Gambar atau tabel terlalu kecil
- Gambar atau tabel terlalu jauh dari teks yang menguraikannya
- Layout nya kurang baik, sehingga susah dibaca atau ditafsirkan
- Kurang informasi/legenda
- Label tidak jelas

Masalah dalam penyajian hasil riset

- Nilai X atau Y tidak jelas
- Gambar atau tabel tidak bernama
- Label pada posisi yang salah.
- Sumber data tidak disebut /plagiariasi

Application of a Locally Isolated Rhizobacteria to Enhance Tolerance of Banana to *Fusarium* wilt

[1]Illani Zuraihah Ibrahim, [2]Sariah Meon, [2]Zakaria Wahab and [1]Zulkifli H. Shamsuddin
[1]Department of Land Management, [2]Department of Plant Protection and [3]Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia

Summary

Plant growth promoting rhizobacteria (PGPR) has a significant impact on plant growth and development through direct or indirect mechanisms. Direct promotions of plant growth by PGPR are based on the ability of the bacteria to synthesize and facilitate nutrient uptake from the environment. The indirect mechanism, however, occurs when these bacteria decrease or prevent the deleterious effects of a phytopathogenic organism (usually fungus) by one or several mechanisms such as production of antibiotic and antifungal metabolite or enzyme that could lyse the fungal cell wall. This advantage could lead to usefulness of PGPR as a biocontrol agent besides being a bioenhancer to plant growth. An *in-vitro* and glasshouse study were conducted to evaluate the effectiveness of *Bacillus sphaericus* UPMB10 as a plant growth enhancer and biological control in increasing tolerance of banana to *Fusarium* infection.

Antagonistic test

Fig 1: *B.sphaericus* UPMB10 inhibited mycelial growth (65-70%) of *F. oxysporum* f.sp. *cubense* race 4 (FOC4) in streak (Plate a) and ringed form (Plate b). Plate c : Control with FOC4 only.

Hyphal morphology

Fig 2: (Left) Light microscopy shows abnormalities of FOC4 hyphae with UPMB10 in culture medium; thickened and vacuolar hyphal strand. (Right) Normal fungal growth with smooth hyphal wall.

Glasshouse experiment

Fig 6: Evaluation of solid PGPR inoculum to increase tolerance to *Fusarium* infection in banana.

Preliminary glasshouse experiment

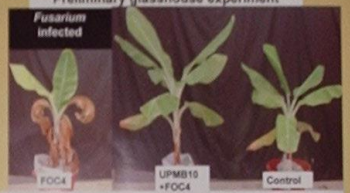


Figure 3: Infected plants (FOC4) and inoculated plant (UPMB10 +FOC4) compared with control (non-inoculated).

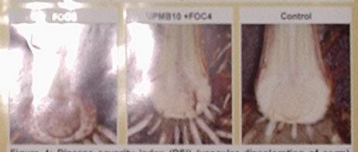


Figure 4: Disease severity index (DSI) (vascular discoloration of corm) (left, most severe; right, uninfected control) of banana seedlings var. *Berangan* cv. *Intan* challenged with FOC4 after 60 days.

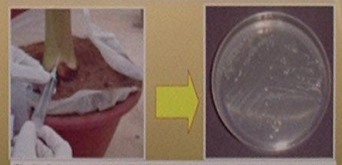


Fig 5 : Culture of PGPR UPMB10 (right) extracted from inoculated pseudostem tissue (left)

Project Potential

- ❑ *B.sphaericus* UPMB10 is a potential biocontrol agent; it inhibits *Fusarium* infection and stimulates plant growth.
- ❑ *B.sphaericus* UPMB10 inoculation reduces the severity of *Fusarium* wilt.
- ❑ *B.sphaericus* UPMB10 promotes root development, plant growth and increases nutrient uptake.

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Department of Land Management, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan.
Tel: 03-8946 6990 e-mail:zulsham@agri.upm.edu.my

S-14

MANAGING PHOSPHORUS FERTILIZERS FOR OPTIMUM EFFECTIVENESS TO PLANTS ON ACID TROPICAL SOILS

Zaharah[1] A. Rahman and Esther W. Gikonyo[2]

Summary

Agro-environmentally sound and cost effective fertilizer management requires assessment of residual effectiveness of different fertilizers over time. The relative effectiveness (RE) of phosphate fertilizers consisting of triple superphosphate (TSP) and phosphate rocks from Gafsa (GPR) and Christmas Island (CIPR) with and without addition of manure were evaluated in an acid tropical soil. Current and residual effectiveness of the fertilizers were measured relative to the effectiveness of freshly applied TSP in a field experiment established with treatment combinations of 0, 100, 200 and 300 kg P ha^{-1}, with and without the additions of cattle manure (20 t ha^{-1}) using Setaria grass (*Setaria anceps stapf.* cv. Kazungula) as a test crop. The highest cumulative yields were produced from TSP while CIPR gave the lowest yields, thus conforming to their P solubility. Dry matter yield (DMY) increased to a maximum at 200 kg P ha^{-1} and declined at 300 kg P ha^{-1}. Manure markedly improved DMY from CIPR but not from GPR and TSP, probably through increased dissolution of rocks coupled with reduced P sorption resulting in excessively high P levels that depressed yields. Despite the high P rates applied, DMY increased to a maximum (9.7 t ha^{-1}) in harvest 2 and then declined to less than 3 t ha^{-1} at harvest 7. TSP showed the highest current RE at 100 kg P ha^{-1} and declined at every harvest. CIPR alone was the least effective, but the addition of manure enhanced its RE to the highest. When P rate increased to 300 kg P ha^{-1}, current RE for TSP decreased to 40%, CIPR to about 20%, and GPR remained unchanged. With manure application, RE were improved substantially but declined speedily with time. The current findings showed that phosphate rocks when applied together with animal manure could substitute for TSP but they are not agronomically beneficial one year after application, even at high rates of application. The decline in RE could not be adequately explained by the conventional soil test methods but was better explained by P fractions.

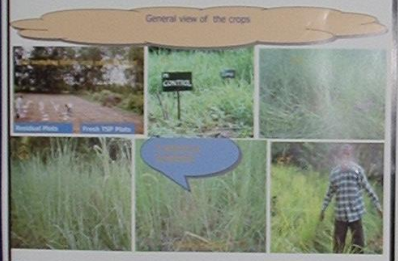

Figure 1. Photograph showing field demarcations, soil sampling and various crops

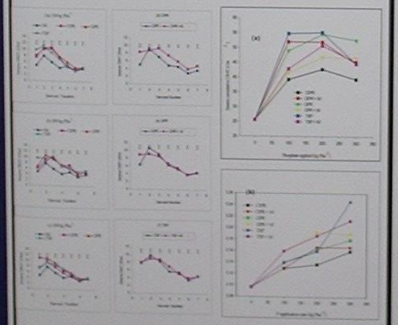

Figure 2. Effect of Fertilizer Types x Rate (a to c) and manure x fertilizer type (d to e) on Setaria Dry Matter Yields for seven Harvests and interaction

Figure 3. Effect Fertilizer Type x Rate on (a) Cumulative Dry Matter Yield and (b) Average P content

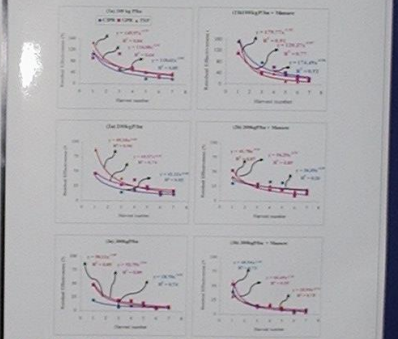

Figure 4. Residual effectiveness changes of different fertilizers with harvest number at different P rates with and without manure respectively

Table 1. Regression parameters for Bray-1P , Mehlich 3-P and Pi-P on P uptake & Yield and estimated critical P levels. * and ** denotes significance at 5% and 10% respectively.

	Bray P			Mehlich P			Resin P		
Harvest	P uptake R^2	DMY R^2	Critical Level (mg P kg^{-1})	P uptake R^2	DMY R^2	Critical Level (mg P kg^{-1})	P uptake R^2	DMY R^2	Critical Level (mg P kg^{-1})
AR	0.26**	0.10**	20	0.21**	0.08	26	0.21**	0.085	19
1	0.55*	0.76*	20	0.33	0.42*	28	0.47*	0.80*	19
2	0.39	0.89*	20	0.29	0.80	28	0.31	0.14	19
3	0.43*	0.04	20	0.40*	0.0096	28	0.39	0.01	19
4	0.52*	0.16	19	0.56*	0.19	30	0.13	0.07	19
5	0.37*	0.14	20	0.64**	0.14	30	0.72**	0.23	19
6	0.39*	0.07	20	0.54*	0.06	30	0.17	0.01	19
7	0.38	0.009	19	0.27	0.02	30	0.62**	0.04	17

Table 2. Multiple regression Equations relating P content, DMY and Residual Value with the Soil P fractions

P content = (37 + 0.41 Bicarbonate-Pi +0.2 HCl-P + 0.8 Residue-P)* 10^{-1}, R^2= 0.87**

DMY = 15.4 – 0.11 Hydroxide-Po – 0.05 Hydroxide-Pi + 0.13 Bicarbonate-Po + 0.04 Bicarbonate-Pi + 0.05 HCl, R^2 = 0.62**

RV = 113.1 + 3.12 Bicarbonate-Po – 0.66 Hydroxide-Pi -0.91 Hydroxide-Po, R^2 = 0.56**

Researchers
[1] Professor, Department of Land Management, UPM, 43400, Serdang. Email: [redacted]
[2]Graduate Student, Dept. of Land Management, UPM. Email: [redacted]


AND KINETIN EITHER
SULPHATE ON SHOOT MULTIPLICATION IN
MANGOSTEEN (Garcinia mangostana L.)
Mihdzar Abdul Kadir, Maheran Abdul Aziz, Azmi Abdul Rashid and Suci Rahayu.
ABSTRACT
Garcinia mangostana still remains an underexploited tropical
fruit, unknown and unavailable to many consumers in the industrialized
nations especially in the temperate region
(Nicholas,1992; Wiebel, et al.,1992). It is highly esteemed in South Asia
or tropical Asia (National Academy of Science, 1975, Coronel, 1983) and
has very considerable economic potential both for local consumption
and export (Richards, 1990; Rahim and Espig, 1991). Continuity of
supply will be desirable, and the development of soundly based
production system is essential (Nichols, 1992). The development of
mangosteen plant is slow and it takes about 10 - 12 years before
fruiting (Richards, 1990). Because of the long juvenile phase and
uncertain bearing behaviour, large scale planting of this tropical crop
has not occurred (Wiebel,et al., 1992). This may involve the use of
genetically improved (clonal rather than seedling) planting materials,
dwarfing rootstocks (where possible). Mangosteen seeds are grouped
under recalcitrant seeds. The recalcitrant behavior causes difficulties in
producing planting materials throughout the year. Tissue culture is an
alternative approach for the mass production of mangosteen
(Garcinia mangostana L.) planting materials. Two month-old shoots
derived from seed explants were subcultured on various
concentrations of BAP and Kinetin either alone or in combination with
100 mgL-1 adenine sulphate. Murashige and Skoog medium was used
as a basal medium enriched with 30 gL-1 sucrose, and 3.3 mgL-1
Gelrite agar. The shoots were cultured for 5 months. There were
significant differences in shoot multiplication among the treatments.
The most suitable medium for shoot multiplication was 2 mgL-1 BAP
(39.56 shoots per explant) and the highest shoot height (0.85 cm) was
attained on 4 mgl kinetin.
Seedlings ready for field planting
Root initiation in medium containing Auxin
Shoot Multiplication
Plantlet elongation
Initial shoot formation
Contact Person:
Assoc. Prof Dr. Mihdzar Abdul Kadir
Department Of Agriculture Technology, Universiti Putra Malaysia.
Tel: 03-89464148, Email: mihdzar@agri.upm.edu.my
T 03
The Value of Horseshoe Crab
Horseshoe Crab Potentials
Eggs
Food
Shell
Horseshoe Crab Culture


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A 01

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ANUGERAH KECEMERLANGAN YANG DI TERIMA (2002-2006)
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3R SOFTWARE FOR AGRICULTURE EFFICIENT PREDICTION SYSTEM
inspem

PAPAN KENYATAAN

GROWTH AND YIELD RESPONSE OF TOMATO TO *TRICHODERMA* ENOCULANTS

EFFECT OF BIO-PELLETING ON

ABSTRACT

MATERIALS AND METHODS

RESULTS AND DISCUSSION

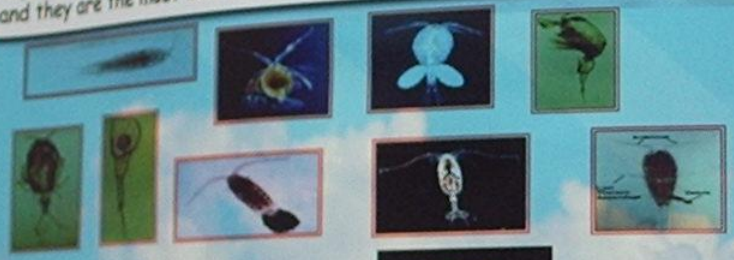
PROJECT'S POTENTIAL :

- Bio-pelleting can improve vigor and keeping quality of leaf mustard seeds in storage
- The use of UPM 23 as the active material in seed treatment can protect the seeds against storage fungi and seedling diseases caused by *Pythium*

A STATISTICAL SOFTWARE (COPEPREDS 1.0) FOR PREDICTING COPEPOD NAUPLII DENSITIES IN THE STRAITS OF MALACCA

1. WHAT ARE COPEPODS ?

Copepods are small crustaceans inhabiting almost all aquatic environments and they are the most abundant zooplankton group in the Straits of Malacca.



Their Life Cycle is shown in the diagram.

2. IMPORTANCE OF COPEPODS

- water quality indicator, including pollution
- form the food for many important fish species
- indicates fertility of water mass.

3. USUAL METHOD OF OBTAINING COPEPOD NAUPLII DENSITIES

- go out to sea to collect samples

4. A SIMPLER SOLUTION & PRODUCT OFFERED

Use the software (COPEPREDS 1.0) to get estimates.

NOVELTY : Construction of the model

5. DESCRIPTION OF PRODUCT

The product known as COPEPREDS 1.0 is the acronymn for Copepod Prediction System.

To use this product,

- one has to simply click on any point in the Straits of Malacca
- click the input predicting variable followed by the predict button
- then, click the view prediction button and the following results will be displayed.
  - Distance from shoreline
  - Nauplii Density
  - Upper bound
  - Lower bound

The product is available on CD

0011 0010 1010 110

OIL PALM BUNCH RIPENESS METER

Project Summary

The industry standard practice of determining bunch ripeness of oil palm tree based on the number of detached fruits per bunch is not accurate. Ripening within a bunch is not uniform. The close relationship between moisture content and oil content in oil palm fruits provides an alternative yet accurate method to determine the stages of fruit ripeness. We introduce a simple, fast and accurate instrument to overcome this problem. The instrument is essentially a PC-based microwave reflection measurement of moisture content in oil palm fruits. We have successfully tested hundreds of fruit bunches with sufficient accuracy to determine the stages of fruit ripeness.

Technology/Product/Services Offered

A Simple, Fast and Accurate Device to determine Ripeness of Oil Palm Fruits

Impact towards the Country and the Society

Improved Quality and Quantity of Palm Oil Production

Environmental-friendly and/or Social Value

Fully environmental friendly. A simple method for both Oil palm producers and buyers to determine quality and subsequently the price of the oil palm fruits

Project's Potential

Oil palm Industry

Project's Potential Safety Criteria Exhibited

100 % safe for tester and palm oil consumers

Industry Partnerships Sought

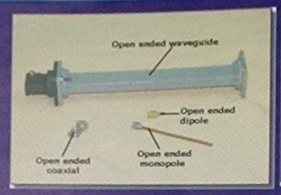
Oil Palm Plantation Companies

Knowledge/Technology Advancement Contribution

Optimum harvesting of fruits

Originality and/or Innovativeness

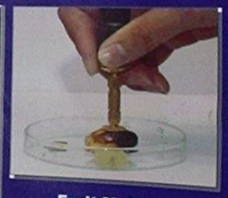
- Degree of fruit ripeness indicated by level of moisture content in the fruit
- Instant reading in digital format
- Suitable for use for batch processing of fruits
- Data can be stored and recalled using PC
- Non destructive method
- No skills required
- Accuracy within 5 % compared to laborious, standard oven drying method



Ripeness Sensors


Microwave Directional Coupler

UPM Ripeness Meter Software


Fruit Moisture Measurement


Measurement Set Up

Fruit Samples

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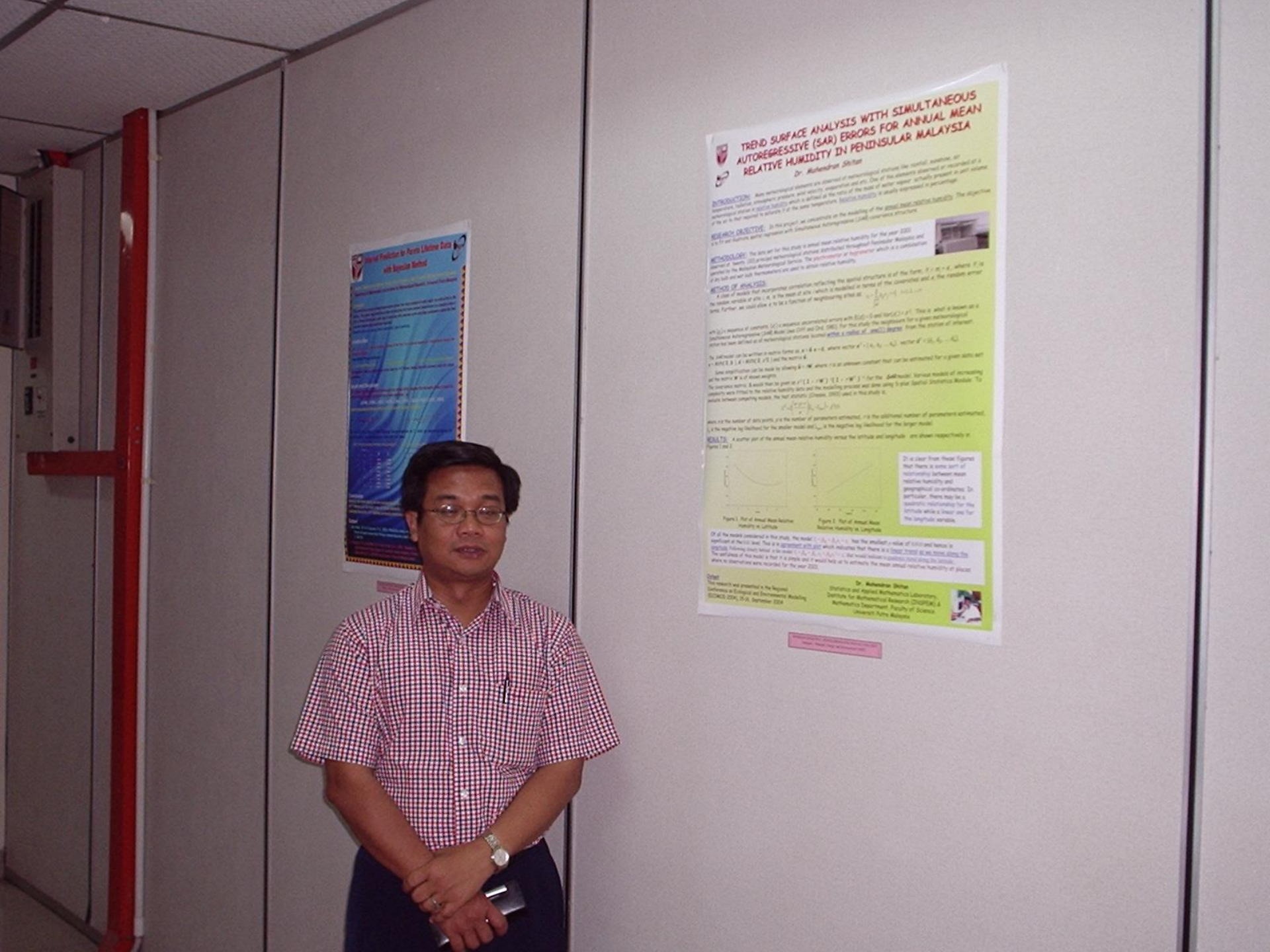

TREND SURFACE ANALYSIS WITH SIMULTANEOUS AUTOREGRESSIVE (SAR) ERRORS FOR ANNUAL MEAN RELATIVE HUMIDITY IN PENINSULAR MALAYSIA

Dr. Mohendran Shitan

INTRODUCTION: Many meteorological elements are observed at meteorological stations like rainfall, sunshine, air temperature, humidity, atmospheric pressure, wind velocity, evaporation and etc. One of this elements observed or recorded at a meteorological station is relative humidity which is defined as the ratio of the mass of water vapour actually present in unit volume of the air to that required to saturate it at the same temperature. Relative humidity is usually expressed in percentage.

RESEARCH OBJECTIVE: In this project, we concentrate on the modelling of the annual mean relative humidity. The objective is to fit and illustrate spatial regression with Simultaneous Autoregressive (SAR) covariance structure.

METHODOLOGY: The data set for this study is annual mean relative humidity for the year 2003 observed at twenty (20) principal meteorological stations distributed throughout Peninsular Malaysia and operated by the Malaysian Meteorological Services. The psychrometer or hygrometer which is a combination of dry bulb and wet bulb thermometers are used to obtain relative humidity.

METHOD OF ANALYSIS:

A class of models that incorporated correlation reflecting the spatial structure is of the form: $Y = X\beta + \varepsilon$, where Y is the random variable of site i, X is the values of site i which is modelled in terms of the covariates and ε the random error term. Further, we could allow ε to be a function of neighbouring sites as:

$$\varepsilon_i = \frac{1}{m}\sum_{j=1}^{m} w_{ij}\varepsilon_j + u_i$$

with $\{u_i\}$ a sequence of constants, $\{\varepsilon_i\}$ a sequence uncorrelated errors with $E(\varepsilon_i) = 0$ and $\mathrm{Var}(\varepsilon_i) = \sigma^2$. This is known as a Simultaneous Autoregressive (SAR) Model (Cliff and Ord, 1981). For this study the neighbours for a given meteorological station has been defined as all meteorological stations located within a radius of 1 degree from the station of interest.

The SAR model can be written in matrix forms as $\varepsilon = \lambda W\varepsilon + u$, where vector $\varepsilon^T = (\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_n)$, vector $u^T = (u_1, u_2, \ldots, u_n)$, $u \sim N(0, \Sigma)$, $\Sigma = \sigma^2 I$, I and the matrix W.

Some simplification can be made by allowing $\tilde{W} = W\varepsilon$, where τ is an unknown constant that can be estimated for a given matrix and the matrix W is of known weights.

The covariance matrix, Σ would then be given as $\sigma^2[(1-\tau W)^T(1-\tau W)]^{-1}$ for the *SAR* model. Various models of increasing complexity were fitted to the relative humidity data and the modelling process was done using S-plus Spatial Statistics Module. To evaluate between competing models, the *Akaike's Information Criterion, (AIC)* used in this study is:

$$AIC = n\left(\ln\frac{2\pi}{n}\right) + n + 2p$$

where, n is the number of data points, p is the number of parameters estimated, r is the additional number of parameters estimated, L_0 is the negative log likelihood for the smaller model and L_{0+r} is the negative log likelihood for the larger model.

RESULTS: A scatter plot of the annual mean relative humidity versus the latitude and longitude are shown respectively in Figures 1 and 2.

Figure 1. Plot of Annual Mean Relative Humidity vs Latitude

Figure 2. Plot of Annual Mean Relative Humidity vs Longitude

It is clear from these figures that there is some sort of relationship between mean relative humidity and geographical co-ordinates. In particular, there may be a quadratic relationship for the latitude while a linear one for the longitude variable.

Of all the models considered in this study, the model $\varepsilon_i = \beta_0 + \beta_1 x_i + \beta_2 y_i + \varepsilon_i$ has the smallest ρ-value of 0.010 and hence is significant at the 0.01 level. This is in agreement with plot which indicates that there is a linear trend as we move along the longitude. Following Unwin, Kemp & Simpson (1989), the model $\varepsilon_i = \beta_0 + \beta_1 x_i + \beta_2 y_i + \beta_3 y_i^2 + \varepsilon_i$ that would indicate a quadratic trend along the latitude. The goodness of this model is that it is simple and it would help us to estimate the mean annual relative humidity at places where no observations were recorded for the year 2003.

Acknowledgement
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Karakterisasi Awal Beberapa Aspek
Biomolekular dari Isolat Xilanolitik
Termofilik RT-3
KEEFEKTIFAN SUARA SERANGGA
DAN URIN PREDATOR DALAM
PENGENDALIAN TIKUS DI GUDANG
PENDAHULUAN
BAHAN DAN METODE
KESIMPULAN
DAFTAR PUSTAKA

BERANI MENCOBA

Jangan takut gagal
sebelum mencoba!
Jangan takut jatuh
sebelum melangkah!
Kesuksesan milik orang
yang berani mencoba.
Ingat! Apa yang tidak mungkin
seringkali belum pernah dicoba!


YES
you can!