

Lampiran 1. Uji chi square kepadatan *Nannochloropsis* sp.

Tabel kontingensi

A	B	A+B
C	D	C+D
A+C	B+D	N

$$\chi^2 = \frac{N \left(|AD - BC| - \frac{N}{2} \right)^2}{(A + B) (C + D) (A + D) (B + D)} \text{ db 1}$$

χ^2 tabel db 1 = 3.84

➤ Kepadatan Awal (10^5 sel/ml)

perlakuan		Nitrogen		Total
		N1	N2	
salinitas	S1	370	331	701
	S2	332	353	685
Total		702	684	1386

$$\chi^2 = \frac{1386 \left(|(370 \times 353) - (331 \times 332)| - \frac{1386}{2} \right)^2}{(701) (685) (702) (684)}$$

$$\chi^2 = \frac{1386 (|20718| - 693)^2}{2.306 \times 10^{11}}$$

$$\chi^2 = \frac{1386 (20025)^2}{2.306 \times 10^{11}} = \frac{5.56 \times 10^{11}}{2.306 \times 10^{11}} = 2.41 < \chi^2 \text{ tabel } 0.05 = 3.84$$

$$C = \sqrt{\frac{\chi^2}{N + \chi^2}} = \sqrt{\frac{2.41}{1386 + 2.41}} = \sqrt{\frac{2.41}{1388.41}} = \sqrt{0.001736} = 0.0417$$

➤ Kepadatan Akhir

Perlakuan		Nitrogen		Total
		N1	N2	
salinitas	S1	1370	1167	2537
	S2	1370	1344	2714
Total		2740	2511	5251

$$x^2 = \frac{5251 \left(|(1370 \times 1344) - (1167 \times 1370)| - \frac{5251}{2} \right)^2}{(2537) (2714) (2740) (2511)}$$

$$x^2 = \frac{5251 (|242490| - 2625.5)^2}{4.74 \times 10^{13}}$$

$$x^2 = \frac{5251 (239864.5)^2}{4.74 \times 10^{13}} = \frac{3.02 \times 10^{14}}{4.74 \times 10^{13}} = 6.37 > \chi^2 \text{ tabel } 0.05 = 3.84$$

$$C = \sqrt{\frac{\chi^2}{N + \chi^2}} = \sqrt{\frac{6.37}{5251 + 6.37}} = \sqrt{\frac{6.37}{5257.37}} = \sqrt{0.00121} = \mathbf{0.035}$$

➤ Kepadatan Awal - Akhir

	Awal	Akhir	Total
A	123	457	580
B	110	389	499
C	111	456	567
D	118	448	566
Total	463	1750	2212

perlakuan		Nitrogen		Total
		N1	N2	
salinitas	S1	580	499	1079
	S2	567	566	1133
Total		1147	1065	2212

$$x^2 = \frac{2212 \left(|(580 \times 566) - (499 \times 567)| - \frac{2212}{2} \right)^2}{(1079) (1133) (1147) (1065)}$$

$$x^2 = \frac{2212 (|45347| - 1106)^2}{1.49 \times 10^{12}}$$

$$x^2 = \frac{2212 (44241)^2}{1.49 \times 10^{12}} = \frac{4.33 \times 10^{12}}{1.49 \times 10^{12}} = 2.89 > \chi^2 \text{ tabel } 0.05 = 3.84$$

$$C = \sqrt{\frac{\chi^2}{N + \chi^2}} = \sqrt{\frac{2.89}{2212 + 2.89}} = \sqrt{\frac{2.89}{2214.89}} = \sqrt{0.0013} = 0.0361$$

Antar Perlakuan

$$\chi^2 = \sum_{i,j} \frac{(o_{ij} - E_{ij})^2}{E_{ij}}$$

$$db (r-1) (k-1) = (2-1) (3-1) = 2$$

$$\chi^2 \text{ tabel } 0.05 = 5.99$$

- **Awal Kultur**

- Perlakuan A – B

	U1	U2	U3	Total
A	121	140	110	371
B	104	127	100	331
Total	225	267	210	702

Eij	U1	U2	U3
A	118.91	141.107	110.983
B	106.09	125.893	99.0171

χ^2	0.03673	0.00868	0.0087
hitung	0.04116	0.00973	0.00976

$$\chi^2 = 0.11 < \chi^2 \text{ tabel } 0.05 = 5.99$$

- Perlakuan A – C

	U1	U2	U3	Total
A	121	140	110	371
C	120	108	104	332
Total	241	248	214	703

Eij	U1	U2	U3
A	127.185	130.879	112.936
C	113.815	117.121	101.064

χ^2	0.30077	0.63563	0.07633
hitung	0.3361	0.7103	0.08529

$$\chi^2 = 2.14 < \chi^2 \text{ tabel } 0.05 = 5.99$$

- Perlakuan A – D

	U1	U2	U3	Total
A	121	140	110	371
D	123	122	108	353
Total	244	262	218	724

Eij	U1	U2	U3
A	125.033	134.257	111.71
D	118.967	127.743	106.29

χ^2	0.1301	0.24567	0.02617
hitung	0.13673	0.2582	0.02751

$$x^2 = 0.82 < \chi^2 \text{ tabel }_{0.05} = 5.99$$

- Perlakuan B – C

	U1	U2	U3	Total
B	104	127	100	331
C	120	108	104	332
Total	224	235	204	663

Eij	U1	U2	U3
B	111.831	117.323	101.846
C	112.169	117.677	102.154

χ^2	0.54838	0.79821	0.03347
hitung	0.54673	0.79581	0.03336

$$x^2 = 2.75 < \chi^2 \text{ tabel }_{0.05} = 5.99$$

- Perlakuan B – D

	U1	U2	U3	Total
B	104	127	100	331
D	123	122	108	353
Total	227	249	208	684

Eij	U1	U2	U3
B	109.849	120.496	100.655
D	117.151	128.504	107.345

χ^2	0.31148	0.35111	0.00426
hitung	0.29207	0.32923	0.004

$$x^2 = 1.29 < \chi^2 \text{ tabel }_{0.05} = 5.99$$

- Perlakuan C – D

	U1	U2	U3	Total
C	120	108	104	332
D	123	122	108	353
Total	243	230	212	685

Eij	U1	U2	U3
A	117.775	111.474	102.75
B	125.225	118.526	109.25

χ^2	0.04203	0.10829	0.0152
hitung	0.03953	0.10185	0.01429

$$x^2 = 0.32 < \chi^2 \text{ tabel}_{0.05} = 5.99$$

• **Akhir Kultur**

- Perlakuan A' – B'

	U1	U2	U3	Total
A'	492	429	450	1371
B'	326	458	384	1168
Total	818	887	834	2539

Eij	U1	U2	U3
A'	441.701	478.959	450.34
B'	376.299	408.041	383.66

χ^2	5.72791	5.2111	0.00026
hitung	6.72343	6.1168	0.0003

$$x^2 = 23.77 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan A' – C'

	U1	U2	U3	Total
A'	492	429	450	1371
C'	465	448	457	1370
Total	957	877	907	2741

Eij	U1	U2	U3
A'	478.675	438.66	453.665
C'	478.675	438.34	453.335

χ^2	0.37096	0.21273	0.02962
hitung	0.39065	0.21288	0.02964

$$x^2 = 1.25 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan A' – D'

	U1	U2	U3	Total
A'	492	429	450	1371
D'	471	450	423	1344
Total	963	879	873	2715

Eij	U1	U2	U3
A'	486.288	443.871	440.841
D'	476.712	435.129	432.159

χ^2	0.06708	0.4982	0.19029
hitung	0.06843	0.50821	0.19412

$$x^2 = 1.52 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan B' – C'

	U1	U2	U3	Total
B'	326	458	384	1168
C'	465	448	457	1370
Total	791	906	841	2538

Eij	U1	U2	U3
B	364.022	416.946	387.032
C	426.978	489.054	453.968

χ^2	3.9714	4.0424	0.02376
hitung	3.38584	3.44637	0.02025

$$x^2 = 14.89 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan B' – D'

	U1	U2	U3	Total
B'	326	458	384	1168
D'	471	450	423	1344
Total	797	908	807	2512

Eij	U1	U2	U3
B	370.58	422.191	375.229
D	426.42	485.809	431.771

χ^2	5.36279	3.0372	0.20501
hitung	4.66052	2.63947	0.17816

$$x^2 = 16.08 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan C' – D'

	U1	U2	U3	Total
C'	465	448	457	1370
D'	471	450	423	1344
Total	936	898	880	2714

Eij	U1	U2	U3
A	472.483	453.301	444.215
B	463.517	444.699	435.785

χ^2	0.11853	0.062	0.36796
hitung	0.12082	0.0632	0.37507

$$x^2 = 1.1 < \chi^2 \text{ tabel}_{0.05} = 5.99$$

• **Awal dan Akhir Kultur**

- Perlakuan A – A'

	U1	U2	U3	Total
A	121	140	110	371
A'	492	429	450	1371
Total	613	569	560	1742

Eij	U1	U2	U3
A	130.553	121.182	119.265
A'	482.447	447.818	440.735

χ^2	0.699	2.9222	0.71978
hitung	0.18915	0.79076	0.19478

$$x^2 = 5.51 < \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan B – B'

	U1	U2	U3	Total
B	104	127	100	331
B'	326	458	384	1168
total	430	585	484	1499

Eij	U1	U2	U3
B	94.95	129.176	106.874
B'	335.05	455.824	377.126

χ^2	0.86259	0.03666	0.44212
hitung	0.24445	0.01039	0.12529

$$x^2 = 1.72 > \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Peralkuan C – C'

	U1	U2	U3	Total
C	120	108	104	332
C'	465	448	457	1370
Total	585	556	561	1702

Eij	U1	U2	U3
C	114.113	108.456	109.431
C'	470.887	447.544	451.569

χ^2	0.30373	0.00192	0.26956
hitung	0.0736	0.00046	0.06532

$$x^2 = 0.71 < \chi^2 \text{ tabel}_{0.05} = 5.99$$

- Perlakuan D – D'

	U1	U2	U3	Total
D	123	122	108	353
D'	471	450	423	1344
Total	594	572	531	1697

Eij	U1	U2	U3
D	123.56	118.984	110.456
D'	470.44	453.016	420.544

χ^2	0.00254	0.07644	0.05459
hitung	0.00067	0.02008	0.01434

$$x^2 = 0.17 < \chi^2 \text{ tabel}_{0.05} = 5.99$$