

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

Berdasarkan hasil penelitian yang dilakukan maka dapat ditarik kesimpulan sebagai berikut:

1. Kebutuhan air tanaman cabai merah tergantung pada umur tanaman. Yaitu 0,282 L/hari dalam 1 bulan, 2,482 L/hari pada 2 bulan, 13.595 L/hari pada 3 bulan, dan 15.881 L/hari pada 4 bulan. tanaman bulan.
2. Waktu berjalan irigasi tetes cabai merah adalah 0,048 jam/hari untuk tanaman umur 1 bulan, 0,424 jam/hari untuk tanaman umur 2 bulan, 2.324 jam/hari untuk tanaman umur 3 bulan, dan 2.324 jam/hari untuk tanaman umur 1 bulan. jam/hari untuk tanaman umur 3 bulan 2.714 jam/hari. Berumur selama 4 bulan dengan output rata-rata 1.377 l/jam

5.2 Saran

Saran penulis kepada pembaca dari hasil laporan tugas akhir ini Penelitian selanjutnya memerlukan informasi data yang terupdate seperti iklim, evaporasi dan kadar air tanah agar hasil penelitian lebih akurat.

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LAMPIRAN

Lampiran 1. Pengujian Emiter

Perhitungan Debit emiter

-volume gelas

$$\begin{aligned} \text{volume} &= \frac{22}{7} \times 3.15^2 \times 2 \\ &= 69 \text{ ml} \end{aligned}$$

Tabel 5.1 perhitungan volume gelas ukur

DATA UKUR TINGGI AIR DALAM GELAS UKUR					VOLUME AIR DALAM GELAS UKUR		
NO	NAMA	T 45 CM	T 110 CM	T 180 CM	45/20	110/20	180/20
1	P1	2	2.2	3.5	62	69	109
2	P2	1.9	2.3	3.5	59	72	109
3	P3	1.9	2.2	3.5	59	69	109
4	P4	2	2.2	3.1	62	69	97
5	P5	2	2.2	3.4	62	69	106
6	P6	2.1	2.3	3.4	65	72	106
7	P7	2	2.3	3.6	62	72	112
8	P8	2.1	2.4	3.6	65	75	112
9	P9	1.9	2.1	3.4	59	65	106
10	P10	2.1	2.3	3.5	65	72	109
11	P11	2.1	2.4	3.7	65	75	115
12	P12	2.2	2.5	3.9	69	78	122

-Perhitungan debit

Tinggi 0,45 m

$$\begin{aligned} Q &= \frac{\text{Volume (ml)}}{\text{waktu (menit)}} = \frac{62 \text{ ml}}{20 \text{ s}} = \frac{0,062}{0,333 \text{ jam}} \\ &= 0,187 \text{ l/jam} \end{aligned}$$

Tabel 5.2 perhitungan debit emitter (tinggi 0,45 m)

NO	Volume	Waktu	Volume	Waktu	Debit
	ml	t	l	jam	
Q1	62	20	0.062	0.333	0.187
Q2	59	20	0.059	0.333	0.178
Q3	59	20	0.059	0.333	0.178
Q4	62	20	0.062	0.333	0.187
Q5	62	20	0.062	0.333	0.187
Q6	65	20	0.065	0.333	0.196
Q7	62	20	0.062	0.333	0.187
Q8	65	20	0.065	0.333	0.196
Q9	59	20	0.059	0.333	0.178
Q10	65	20	0.065	0.333	0.196
Q11	65	20	0.065	0.333	0.196
Q12	69	20	0.069	0.333	0.206
Q Rata- rata					0.189

Tinggi 1,10 m

$$Q = \frac{\text{Volume (ml)}}{\text{waktu (menit)}} = \frac{69 \text{ ml}}{20 \text{ s}} = \frac{0,069}{0,333 \text{ jam}}$$

$$= 0,206 \text{ l/jam}$$

Tabel 5.3 perhitungan debit emitter (tinggi 1,10 m)

NO	Volume	Waktu	Volume	Waktu	Debit
	ml	t	l	jam	
Q1	69	20	0.069	0.333	0.206
Q2	72	20	0.072	0.333	0.215
Q3	69	20	0.069	0.333	0.206
Q4	69	20	0.069	0.333	0.206
Q5	69	20	0.069	0.333	0.206
Q6	72	20	0.072	0.333	0.215
Q7	72	20	0.072	0.333	0.215
Q8	75	20	0.075	0.333	0.225
Q9	65	20	0.065	0.333	0.196
Q10	72	20	0.072	0.333	0.215
Q11	75	20	0.075	0.333	0.225
Q12	78	20	0.078	0.333	0.234
Q Rata- rata					0.214

Tinggi 1,80 m

$$Q = \frac{\text{Volume (ml)}}{\text{waktu (menit)}} = \frac{109 \text{ ml}}{20 \text{ s}} = \frac{0,109}{0,333 \text{ jam}}$$

$$= 0,327 \text{ l/jam}$$

Tabel 5.4 perhitungan debit emitter (tinggi 1,80 m)

NO	Volume	Waktu	Volume	Waktu	Debit
	ml	t	l	jam	
Q1	109	20	0.109	0.333	0.327
Q2	109	20	0.109	0.333	0.327
Q3	109	20	0.109	0.333	0.327
Q4	97	20	0.097	0.333	0.290
Q5	106	20	0.106	0.333	0.318
Q6	106	20	0.106	0.333	0.318
Q7	112	20	0.112	0.333	0.337
Q8	112	20	0.112	0.333	0.337
Q9	106	20	0.106	0.333	0.318
Q10	109	20	0.109	0.333	0.327
Q11	115	20	0.115	0.333	0.346
Q12	122	20	0.122	0.333	0.365
Q Rata- rata					0.328

Lampiran 2. Data Volume Emiter dari rangkaian irigasi

NO	Volume Emiter (ml)											
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
1	62.37	59.252	59.252	62.37	62.37	65.489	62.37	65.489	59.252	65.489	65.489	68.607
2	68.607	71.726	68.607	68.607	68.607	71.726	71.726	74.844	65.489	71.726	74.844	77.963
3	109.15	109.15	109.15	96.674	106.03	106.03	112.27	112.27	106.03	109.15	115.38	121.62
Rata2	80.042	80.042	79.002	75.884	79.002	81.081	82.121	84.2	76.923	82.121	85.239	89.397

Lampiran 3. Data Debit Emiter dari rangkaian irigasi

NO	Debit Emiter (l/jam)											
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
1	0.1871	0.1778	0.1778	0.1871	0.1871	0.1965	0.1871	0.1965	0.1778	0.1965	0.1965	0.2058
2	0.2058	0.2152	0.2058	0.2058	0.2058	0.2152	0.2152	0.2245	0.1965	0.2152	0.2245	0.2339
3	0.3274	0.3274	0.3274	0.29	0.3181	0.3181	0.3368	0.3368	0.3181	0.3274	0.3462	0.3649
Rata2	0.240	0.240	0.237	0.228	0.237	0.243	0.246	0.253	0.231	0.246	0.256	0.268

Lampiran 4. Hasil perhitungan keseragaman Tetesan

$$Ed = 100\%(1 - \sigma q/q_{rata2})$$

$$Ea = \frac{\sum q}{q_{rata2}} 100\%$$

Dimana: Ed = Efisiensi Distribusi (%)

Σq = Deviasi rata-rata laju emiter (l/jam) q_{rata2} = Laju rata-rata emiter (l/jam)

Ea = Efisiensi Aplikasi (%)

q_{min} = Laju minimum emiter (l/jam)

$$Ed = 100\left(1 - \frac{0,058 \text{ l/jam}}{0,328 \text{ l/jam}}\right)$$

$$= 100\% (0,823)$$

$$= 82\%$$

$$Ea = \frac{0,1777 \text{ l/jam}}{0,189 \text{ l/jam}} = 93,827\%$$

Kriteria Tingkat Keseragaman Tetesan Sistem Irigasi Tetes Menurut ASEA

Kriteria	Statistical Uniformity (SU)	Coefficient Of Uniformity (CU)
Sangat Baik	95 % - 100 %	94 % - 100 %
Baik	85 % - 90 %	81 % - 87 %
Cukup baik	75 % - 80 %	68 % - 75 %
Jelek	65 % - 70 %	56 % - 62 %
Tidak Layak	< 60 %	< 50 %

Lampiran 5. Menghitung Nilai Evapotranspirasi Tanaman Cabe (Etc) padatingkatan Umur/fase pertumbuhan

$$Etc = Eto \times Kc$$

Untuk Umur mulai tanam

$$\begin{aligned} \text{Umur 1 Bulan : Etc} &= 2,044 \text{ mm/hari} \times 0,35 \\ &= 0,7157 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur 1-2 Bulan: Etc} &= 2,048 \text{ mm/hari} \times 0,6 \\ &= 1,229 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur 2-3 Bulan: Etc} &= 2,077 \text{ mm/hari} \times 0,95 \\ &= 1,973 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur 3-4 Bulan: Etc} &= 2,077 \text{ mm/hari} \times 1 \\ &= 2,077 \text{ mm/hari} \end{aligned}$$

Nilai ETC Tanaman Cabai			
Umur	Nilai Kc	Eto	Etc
		mm/hari	mm/hari
1 Bulan	0.35	2.044	0.715428
2 Bulan	0.6	2.048	1.228932
3 Bulan	0.95	2.077	1.97334
4 Bulan	1	2.077	2.0772

Lampiran 6. Menghitung Luasan Kanopi Tanaman Cabe Pada berbagai tingkatan Umur

$$\text{Rumus Luas Kanopi (A)} = \pi \bar{r}^2$$

$$\begin{aligned} \text{Untuk Umur 1 Bulan, Sampel 1 (A1)} &= 3.14 \times 3.500^2 \\ &= 38.465 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 2 (A2)} &= 3.14 \times 4.000^2 \\ &= 50.240 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 3 (A3)} &= 3.14 \times 4.000^2 \\ &= 50.240 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 4 (A4)} &= 3.14 \times 4.000^2 \\ &= 50.240 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 5 (A5)} &= 3.14 \times 4.000^2 \\ &= 50.240 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 6 (A6)} &= 3.14 \times 5.000^2 \\ &= 78.500 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned}\text{Untuk Umur 1 Bulan, Sampel 7 (A7)} &= 3.14 \times 3.500^2 \\ &= 38.465 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 8 (A8)} &= 3.14 \times 4.000^2 \\ &= 50.240 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 9 (A9)} &= 3.14 \times 5.000^2 \\ &= 78.500 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 10 (A10)} &= 3.14 \times 5.000^2 \\ &= 78.500 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 11 (A11)} &= 3.14 \times 3.500^2 \\ &= 38.465 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 12 (A12)} &= 3.14 \times 5.000^2 \\ &= 78.500 \text{ cm}^2\end{aligned}$$

Jadi, luas rata-rata tanaman Cabe umur 3 bulan adalah: 56,716 cm²

$$\begin{aligned}\text{Untuk Umur 2 Bulan, Sampel 1 (A1)} &= 3.14 \times 8.500^2 \\ &= 226.865 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 2 (A2)} &= 3.14 \times 8.000^2 \\ &= 200.960 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 3 (A3)} &= 3.14 \times 8.000^2 \\ &= 200.960 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 4 (A4)} &= 3.14 \times 9.000^2 \\ &= 254.340 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 5 (A5)} &= 3.14 \times 8.000^2 \\ &= 200.960 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sampel 6 (A6)} &= 3.14 \times 11.000^2 \\ &= 379.940 \text{ cm}^2\end{aligned}$$

$$\begin{aligned} \text{Untuk Umur 2 Bulan, Sampel 7 (A7)} &= 3.14 \times 12.500^2 \\ &= 490.625 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 8 (A8)} &= 3.14 \times 11.000^2 \\ &= 379.940 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 9 (A9)} &= 3.14 \times 9.000^2 \\ &= 254.340 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 10 (A10)} &= 3.14 \times 8.000^2 \\ &= 200.960 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 11 (A11)} &= 3.14 \times 11.000^2 \\ &= 379.940 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 12 (A12)} &= 3.14 \times 10.000^2 \\ &= 314.000 \text{ cm}^2 \end{aligned}$$

Jadi, luas rata-rata tanaman Cabe umur 3 bulan adalah: 290,319 cm²

$$\begin{aligned} \text{Untuk Umur 3 Bulan, Sampel 1 (A1)} &= 3.14 \times 20.000^2 \\ &= 1256.000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 2 (A2)} &= 3.14 \times 21.000^2 \\ &= 1384.740 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 3 (A3)} &= 3.14 \times 18.000^2 \\ &= 1017.360 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 4 (A4)} &= 3.14 \times 16.000^2 \\ &= 803.840 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 5 (A5)} &= 3.14 \times 17.500^2 \\ &= 961.625 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 6 (A6)} &= 3.14 \times 18.000^2 \\ &= 1017.360 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Untuk Umur 3 Bulan, Sampel 7 (A7)} &= 3.14 \times 20.000^2 \\ &= 1256.000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 8 (A8)} &= 3.14 \times 15.000^2 \\ &= 706.500 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 9 (A9)} &= 3.14 \times 17.000^2 \\ &= 907.460 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 10 (A10)} &= 3.14 \times 15.000^2 \\ &= 706.500 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 11 (A11)} &= 3.14 \times 17.500^2 \\ &= 961.625 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 12 (A12)} &= 3.14 \times 17.000^2 \\ &= 907.460 \text{ cm}^2 \end{aligned}$$

Jadi, luas rata-rata tanaman Cabe umur 3 bulan adalah: 990,539 cm²

$$\begin{aligned} \text{Untuk Umur 4 Bulan, Sampel 1 (A1)} &= 3.14 \times 25.000^2 \\ &= 1962.500 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 2 (A2)} &= 3.14 \times 26.000^2 \\ &= 2122.640 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 3 (A3)} &= 3.14 \times 23.000^2 \\ &= 1661.060 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 4 (A4)} &= 3.14 \times 22.000^2 \\ &= 1519.760 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 5 (A5)} &= 3.14 \times 23.000^2 \\ &= 1661.060 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 6 (A6)} &= 3.14 \times 23.000^2 \\ &= 1661.060 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Untuk Umur 4 Bulan, Sampel 7 (A7)} &= 3.14 \times 25.000^2 \\ &= 1962.500 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 8 (A8)} &= 3.14 \times 21.000^2 \\ &= 1384.740 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 9 (A9)} &= 3.14 \times 22.000^2 \\ &= 1519.760 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 10 (A10)} &= 3.14 \times 21.000^2 \\ &= 1384.740 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 11 (A11)} &= 3.14 \times 23.000^2 \\ &= 1661.060 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sampel 12 (A12)} &= 3.14 \times 23.000^2 \\ &= 1661.060 \text{ cm}^2 \end{aligned}$$

Jadi, luas rata-rata tanaman Cabe umur 3 bulan adalah: 1680,161 cm²

Lampiran 7. Menghitung Kebutuhan Air Tanaman Cabe pada tingkatan Umur (Td)

$$\begin{aligned} \text{Untuk Tanaman Cabe Umur bulan k-1: } Td &= Ud(0,1(Pd^{0,5})) \\ &= 0.634 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur bulan k-2: } Td &= Ud(0,1(Pd^{0,5})) \\ &= 1.089 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur bulan k-3: } Td &= Ud(0,1(Pd^{0,5})) \\ &= 1.748 \text{ mm/hari} \end{aligned}$$

$$\begin{aligned} \text{Umur bulan k-4: } Td &= Ud(0,1(Pd^{0,5})) \\ &= 1.204 \text{ mm/hari} \end{aligned}$$

Lampiran 8. Dokumentasi Penelitian



Rangkaian Irigasi Tetes umur 1 bulan



Pengukuran debit emiter menggunakan gelas ukur



Pengukuran pertumbuhan pada umur 1 bulan



Tanaman Cabe umur 2 bulan



Tanaman Cabe umur 3 bulan



Pengukuran kanopi pada tanaman Cabe



Pengukuran kanopi pada tanaman Cabe



Lubang emiter



Pemasangan jaringan irigasi



Pembuatan lubang emiter



Pembuatan tiang Tandon