

DAFTAR PUSTAKA

- Akmal, Masimin, & Meilianda, E. (2014). Efisiensi irigasi pada petak tersier di daerah irigasi lawe bulan kabupaten aceh tenggara. *Jurnal Teknik Sipil UNSYIAH*, 3(3), 20–37.
- Endrayanti, K., Munir, A., & Samsuar, S. (2018). Uji Kinerja Micro *sprinkler* Tipe G 360 Degree Rotary. *Jurnal Agritechno*, 11(2), 121–128. <https://doi.org/10.20956/at.v11i2.130>
- Fajar, F., Prawitosari, T., & Munir, A. (2019). Rancang Bangun dan Kinerja Irigasi *Sprinkler* Hand Move Pada Lahan Kering. *Jurnal Agritechno*, 12(1), 17–27. <https://doi.org/10.20956/at.v12i1.183>
- Ferrarezi, R. S., Geiger, T. C., Greenidge, J., Dennery, S., Weiss, S. A., & Vieira, G. H. S. (2020). Microirrigation equipment for okra cultivation in the U.S. Virgin Islands. *HortScience*, 55(7), 1045–1052. <https://doi.org/10.21273/HORTSCI15021-20>
- Kasmir. (2019). *Analisis pemanfaatan pompa air untuk irigasi di desa rato kecamatan bolo kabupaten bima*, Universitas Muhammadiyah Mataram.
- Khairiah, N. I. (2016). *Evaluasi Kinerja Penggunaan Air Irigasi Sprinkler. Makassar*, Universitas Hasanuddin.
- Kurnia, U. (2004). *Prospek pengairan pertanian tanaman semusim lahan kering*. 1(98).
- Lubis, Z., Lungguk, A., Saputra, N., Winata, S., Annisa, A., Muhazzir, B., Satria, M., & Sri, W. (2019). Kontrol Mesin Air Otomatis Berbasis Arduino Dengan Smartphone. *Cetak) Buletin Utama Teknik*, 14(3), 1410–4520.
- Mangrio, A. G., Asif, M., Ahmed, E., Sabir, M. W., Khan, T., & Jahangir, I. (2013). Hydraulic Performance Evaluation of Pressure Compensating (Pc) Emitters and Micro-Tubing for Drip Irrigation System. *Science Technology and Development*, 32(4), 290–298.
- Merkley, & Allen. (2004). Sprinkle & Trickle Irrigation Lecture Notes. *English*, 1–8.
- Prastowo, D. A. (2006). *Teknologi Irigasi Curah*. 5–47.
- Tusi, A., & Lanya, B. (2016). Rancangan irigasi *sprinkler* portable tanaman pakchoy design of portable *sprinkler* for pakchoy plant Oleh : *Jurnal Irigasi*, 11(1), 43–54.
- Yana, K. L., Dantes, K. R., & Wigraha, N. A. (2017). Rancang Bangun Mesin Pompa Air Dengan Sistem Recharging. *Jurnal Pendidikan Teknik Mesin Undiksha*, 5(2). <https://doi.org/10.23887/jjtm.v5i2.10872>

LAMPIRAN

Lampiran 1. Perhitungan

A. Debit

- Skema Segiempat

1. Tekanan 0,95 Bar (*Overlay 0%*)

$$\begin{aligned}Q_1 &= V/t \\ &= \frac{6,78 \text{ L}}{1 \text{ menit}} \\ &= 6,78 \text{ L/menit}\end{aligned}$$

2. Tekanan 0,93 Bar (*Overlay 25%*)

$$\begin{aligned}Q_2 &= V/t \\ &= \frac{6,69 \text{ L}}{1 \text{ menit}} \\ &= 6,69 \text{ L/menit}\end{aligned}$$

3. Tekanan 0,82 Bar (*Overlay 50%*)

$$\begin{aligned}Q_3 &= V/t \\ &= \frac{6,67 \text{ L}}{1 \text{ menit}} \\ &= 6,67 \text{ L/menit}\end{aligned}$$

4. Debit rata-rata

$$\begin{aligned}\bar{Q} &= \frac{Q_1 + Q_2 + Q_3}{3} \\ &= \frac{6,78 + 6,69 + 6,67}{3} \\ &= 10,07 \text{ L/menit}\end{aligned}$$

- Skema Segitiga

1. Tekanan 0,98 Bar (*Overlay 0%*)

$$\begin{aligned}Q_1 &= V/t \\ &= \frac{7,89 \text{ L}}{1 \text{ menit}} \\ &= 7,89 \text{ L/menit}\end{aligned}$$

2. Tekanan 0,90 Bar (*Overlay 25%*)

$$\begin{aligned}Q_1 &= V/t \\ &= \frac{7,83 \text{ L}}{1 \text{ menit}} \\ &= 7,83 \text{ L/menit}\end{aligned}$$

3. Tekanan 0,80 Bar (*Overlay 50%*)

$$\begin{aligned}Q_1 &= V/t \\ &= \frac{6,93 \text{ L}}{1 \text{ menit}} \\ &= 6,93 \text{ L/menit}\end{aligned}$$

4. Debit rata-rata

$$\begin{aligned}\bar{Q} &= \frac{Q_1 + Q_2 + Q_3}{3} \\ &= \frac{7,89 + 7,83 + 6,93}{3} \\ &= 7,55 \text{ L/menit}\end{aligned}$$

B. Luas tangkapan *catch-can*

Dik : $d = 7,4 \text{ cm}$

$r = 3,7 \text{ cm}$

Dit : $A = \dots\dots\dots \text{cm}^2 ?$

$$A = \pi r^2$$

$$A = 3,14 \times 3,7^2$$

$$A = 42,99 \text{ cm}^2$$

C. Koefisien keseragaman

$$CU = 100. \left(1 - \frac{\sum |x_i - \bar{x}|}{\sum x_i} \right)$$

Dimana

CU = koefisien keseragaman

X_i = Nilai masing masing pengamatan

\bar{x} = nilai rata-rata pengamatan

$\sum |x_i - \bar{x}|$ = jumlah tiap pengamatan dibagi dengan jumlah total pengamatan

$\sum x_i$ = jumlah total pengamatan

• Skema Segiempat

1. *Overlay* 0%

Dik :

$$\sum |x_i - \bar{x}| = 127,353$$

$$\sum x_i = 434,217$$

Dit :

$$CU = \dots\dots\dots \%?$$

Jawab:

$$CU = 100. \left(1 - \frac{\sum |x_i - \bar{x}|}{\sum x_i} \right)$$

$$CU = 100. \left(1 - \frac{127,353}{434,217} \right)$$

$$CU = 70,67\%$$

2. *Overlay* 25%

Dik :

$$\sum |x_i - \bar{x}| = 50,500$$

$$\sum x_i = 272,249$$

Dit :

$$CU = \dots\dots\dots\%?$$

Jawab:

$$CU=100. \left(1 - \frac{\sum|x_i - x|}{\sum x_i}\right)$$

$$CU=100. \left(1 - \frac{50,500}{272,249}\right)$$

$$CU= 81,45\%$$

3. *Overlay 50%*

Dik :

$$\sum|x_i - x| = 202,135$$

$$\sum x_i = 520,167$$

Dit :

$$CU = \dots\dots\dots\%?$$

Jawab:

$$CU=100. \left(1 - \frac{\sum|x_i - x|}{\sum x_i}\right)$$

$$CU=100. \left(1 - \frac{202,135}{520,167}\right)$$

$$CU= 61,14\%$$

- Skema Segitiga

1. *Overlay 0%*

Dik :

$$\sum|x_i - x| = 136,231$$

$$\sum x_i = 491,346$$

Dit :

$$CU = \dots\dots\dots\%?$$

Jawab:

$$CU=100. \left(1 - \frac{\sum|x_i - x|}{\sum x_i}\right)$$

$$CU=100. \left(1 - \frac{136,231}{491,346}\right)$$

$$CU= 72,27\%$$

2. *Overlay* 25%

Dik :

$$\sum |x_i - x| = 113,26$$

$$\sum x_i = 570,13$$

Dit :

$$CU = \dots\dots\dots\%?$$

Jawab:

$$CU = 100. \left(1 - \frac{\sum |x_i - x|}{\sum x_i} \right)$$

$$CU = 100. \left(1 - \frac{113,26}{570,13} \right)$$

$$CU = 80,13\%$$

3. *Overlay* 50%

Dik :

$$\sum |x_i - x| = 166,701$$

$$\sum x_i = 438,032$$

Dit :

$$CU = \dots\dots\dots\%?$$

Jawab:

$$CU = 100. \left(1 - \frac{\sum |x_i - x|}{\sum x_i} \right)$$

$$CU = 100. \left(1 - \frac{166,70}{438,03} \right)$$

$$CU = 61,93\%$$

D. Keseragaman distribusi

$$DU = 100 - 1,59 (100 - CU)$$

• Skema Segiempat

1. *Overlay* 0%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 70,67) \\ &= 52,36\% \end{aligned}$$

2. *Overlay* 25%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 81,45) \\ &= 70,50\% \end{aligned}$$

3. *Overlay* 50%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 61,14) \\ &= 38,21\% \end{aligned}$$

- Skema Segitiga

1. *Overlay* 0%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 72,27) \\ &= 51,91\% \end{aligned}$$

2. *Overlay* 25%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 80,13) \\ &= 68,41\% \end{aligned}$$

3. *Overlay* 50%

$$\begin{aligned} DU &= 100 - 1,59 (100 - 61,94) \\ &= 39,48\% \end{aligned}$$

E. Perhitungan Laju penyiraman

$$ROP = \frac{Q}{Se \times Sl \times 0,866}$$

- Skema Segitiga

Diketahui :

- *Overlay* 0%

$$Q = 6,78 \text{ L/menit}$$

$$Se = 2 \text{ m}$$

$$Sl = 2 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{Se \times Sl \times 0,866}$$

$$ROP = \frac{6,78}{2 \times 2 \times 0,866}$$

$$ROP = 1,957 \text{ m/jam}$$

$$ROP = 1.957 \text{ mm/jam}$$

- *Overlay* 25%

Diketahui:

$$Q = 6,69 \text{ L/menit}$$

$$Se = 1,5 \text{ m}$$

$$Sl = 1,5 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{SexSlx0,866}$$

$$ROP = \frac{6,69}{1,5 \times 1,5 \times 0,866}$$

$$ROP = 3,433 \text{ m/jam}$$

$$ROP = 3.433 \text{ mm/jam}$$

- *Overlay 50%*

Diketahui:

$$Q = 6,67 \text{ L/menit}$$

$$Se = 1 \text{ m}$$

$$Sl = 1 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{SexSlx0,866}$$

$$ROP = \frac{6,67}{1 \times 1 \times 0,866}$$

$$ROP = 7,7020 \text{ m/jam}$$

$$ROP = 7.7020 \text{ mm/jam}$$

- *Skema Segiempat*

$$ROP = \frac{Q}{SexSl}$$

- *Overlay 0%*

Diketahui :

$$Q = 7,89 \text{ L/menit}$$

$$Se = 2 \text{ m}$$

$$Sl = 2 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{SexSl}$$

$$ROP = \frac{7,89}{2 \times 2}$$

$$ROP = 1,9725 \text{ m/jam}$$

$$ROP = 1.972,5 \text{ mm/jam}$$

- *Overlay 25%*

Diketahui :

$$Q = 7,83 \text{ L/menit}$$

$$Se = 1,5 \text{ m}$$

$$Sl = 1,5 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{SexSl}$$

$$ROP = \frac{7,83}{1,5 \times 1,5}$$

$$ROP = 3,48 \text{ m/jam}$$

$$ROP = 3.48 \text{ mm/jam}$$

- *Overlay 50%*

Diketahui :

$$Q = 6,93 \text{ L/menit}$$

$$Se = 1 \text{ m}$$

$$Sl = 1 \text{ m}$$

Ditanyakan :

$$ROP = \dots\dots\dots?$$

$$ROP = \frac{Q}{SexSl}$$

$$ROP = \frac{6,93}{1 \times 1}$$

$$ROP = 6,93 \text{ m/jam}$$

$$ROP = 6.930 \text{ mm/jam}$$

Lampiran 2. Spesifikasi

Tabel 7. Spesifikasi *sprinkler*

Jenis	Micro <i>sprinkler</i> 360°	
Spesifikasi	Diameter semburan	1 – 10 feet
	<i>Operating pressure</i>	1-3kg
	Jangkauan pancutan air	¼-5 meter

Tabel 8. Spesifikasi pompa

Merek	Shimizu PS-135 E	
Spesifikasi	Keluaran	125 W
	Masukan	0,3 kW
	Daya hisap maks (Hs)	9 m
	Total kepala maks	33 m
	Kapasitas maks	34 L/mnt
	<i>Head</i> (H)	5 20
	Kapasitas (Q)	28 10
	Pipa hisap	1 inci
	Pipa dorong	1 inci
	Berat	12 Kg

Lampiran 3. Dokumentasi



Gambar 20. *Micro Butterfly Sprinkler*



Gambar 21. Pompa Shimizu Tipe ps-135 E



Gambar 22. Pengukuran kecepatan angin



Gambar 23. Evaluasi kinerja *sprinkler*



Gambar 24. Pengukuran air yang tertampung dalam *catch-can*



Gambar 25. Pengukuran debit yang tertampung dalam wadah.