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Feathertop Rhodes Grass Residual Management Strategies

| | | | |
|------------------|---------------|----------------------|---------------------|
| Trial ID: | LB2109 | Location: | St Ruth |
| | | Investigator: | Linda Bailey |
| | | Trial Year: | 2021 |

Residual herbicides play a vital role in feathertop Rhodes grass (FTR) management as effective, economic knockdown herbicide options are not generally available or pose crop safety risks when applied prior to planting sorghum. In addition, FTR, appears less temperature sensitive than other summer grasses so often germinates in the winter months and after small rainfall events. This project was designed to evaluate the impact of a range of residual herbicides for FTR management in sorghum. The main aim was to evaluate whether split or sequential applications of Dual Gold (metolachlor) could broaden the period of effective residual summer grass control compared to a single application at planting or early in-crop. Alternative residual herbicides with registration prior to, or in sorghum, Valor (flumioxazin) and Gesaprim (atrazine), were included as alternative stand-alone options applied in the fallow and also when 'topped up' with Dual Gold at planting or early in-crop. In addition, three treatments of sequential herbicides prior to planting were evaluated.

| | | | | |
|-----------------------------------|---|---------------------|---|--|
| Objective: | To evaluate the impact of split application of residual herbicides for grass control pre-plant and in-crop | | | |
| Crop (hybrid): | Sorghum (MR Taurus) | | | |
| Planting Date: | 28/10/2021 | | | |
| Planter: | Double disc planter on 0.9 m rows | | | |
| Application: | A | B | C | D |
| Application Date: | 30/07/2021 | 27/08/2021 | 01/11/2021 (4 days after planting) | 13/12/2021 (46 days after planting) |
| Crop Stage at Application: | Pre-planting | Pre-planting | Pre-emergent | GS22 (2 tillers) |
| Nozzles: | AIXR110015 | | | |
| Volume: | 100 L/ha | | | |
| Weeds: | Feathertop Rhodes grass, flaxleaf fleabane and common sowthistle | | | |
| Trial Design: | Randomised complete block of 23 treatments x 4 replicates with embedded factorial of 18 treatments (3 herbicides x 6 timings/use patterns) | | | |
| Plot Size: | 4m x 12m | | | |
| Keywords: | Sorghum, feathertop Rhodes grass, flaxleaf fleabane, common sowthistle, residual | | | |

Key Point:

Immediately prior to planting, the grower applied a commercial knockdown treatment to control a low population of emerged weeds. Dual Gold at 500 mL/ha was included in this mixture and was inadvertently applied across the trial area. Consequently, all treatments listed in the result tables had an additional Dual Gold 500 mL/ha applied at sorghum planting. Interpretations and conclusions are more challenging for this trial as the 'untreated' reference actually has Dual Gold 500 mL/ha at planting. However, the key messages are still clear and important.

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Trial ID: LB2109

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Assessments

Weed counts were immediately prior to both Application B (27/8/21) and planting (28/10/2021). Untreated FTR populations were <0.01/m² at both dates with no significant treatment differences.

NB Application D was NOT applied when 19/11/2021 assessments conducted in table below.

| Scientific Pest Name | | | | Sorghum 19/11/2021 EMERGENCE /m ² 4 m of row 22 DAP | Chloris virgata Feathertop Rhodes Grass | | Conyza bonariensis Flaxleaf Fleabane | Sonchus oleraceus Common Sowthistle |
|-------------------------------|-----------|--------------|-------------|---|---|--|---|---|
| Pest Name | | | | | 19/11/2021 COUNT /m ² < GS13 10 m x 0.9 m 112 DAA/84 DAB/ 18 DAC AA | 2/02/2022 COUNT /m ² GS14-71 10 m x 0.9 m 187 DAA/159 DAB/ 93 DAC/ 51 DAD AS | 2/02/2022 COUNT /m ² ~ 4-7 leaf 10 m x 0.9 m 187 DAA/159 DAB/ 93 DAC/ 51 DAD AS | 2/02/2022 COUNT /m ² ~ 5-7 leaf 10 m x 0.9 m 187 DAA/159 DAB/ 93 DAC/ 51 DAD AS |
| Crop Name | | | | | | | | |
| Assessment Date | | | | | | | | |
| Assessment Type | | | | | | | | |
| Assessment Unit | | | | | | | | |
| Weed Stage | | | | | | | | |
| Assessed Area | | | | | | | | |
| Treatment-Evaluation Interval | | | | | | | | |
| ARM Action Codes | | | | | | | | |
| Trt No. | Treatment | Product Rate | Appln. Code | | | | | |
| 19 | Untreated | - | - | 5.8- | 0b | 0.4a-d | 5.0abc | 0.1cde |
| 1 | Dual Gold | 1000ml/ha | A | 5.8- | 0b | 0d | 3.8abc | 0.1cde |
| 2 | Dual Gold | 1000ml/ha | A | 6.3- | 0b | 0.2bcd | 6.8ab | 0.3a-d |
| | Dual Gold | 500ml/ha | C | | | | | |
| 3 | Dual Gold | 1000ml/ha | A | 5.7- | 0b | 0.0cd | 7.9a | 0.3abc |
| | Dual Gold | 500ml/ha | D | | | | | |
| 4 | Dual Gold | 1000ml/ha | B | 5.8- | 0b | 0.0cd | 4.8abc | 0.3a-d |
| 5 | Dual Gold | 1000ml/ha | B | 5.1- | 0b | 0.3a-d | 5.8abc | 0.3a-d |
| | Dual Gold | 500ml/ha | C | | | | | |
| 6 | Dual Gold | 1000ml/ha | B | 5.4- | 0b | 0.2cd | 5.3abc | 0.1cde |
| | Dual Gold | 500ml/ha | D | | | | | |
| 7 | Gesaprim | 2000g/ha | A | 5.4- | 0.1b | 0.8a | 5.6abc | 0.1b-e |
| 8 | Gesaprim | 2000g/ha | A | 5.9- | 0b | 0.1cd | 3.6abc | 0.1de |
| | Dual Gold | 500ml/ha | C | | | | | |
| 9 | Gesaprim | 2000g/ha | A | 4.9- | 0.2a | 0.7ab | 3.9abc | 0.4ab |
| | Dual Gold | 500ml/ha | D | | | | | |
| 10 | Gesaprim | 2000g/ha | B | 5.5- | 0b | 0.1cd | 2.2cde | 0.2a-e |
| 11 | Gesaprim | 2000g/ha | B | 5.3- | 0b | 0.4a-d | 5.4abc | 0.3abc |
| | Dual Gold | 500ml/ha | C | | | | | |
| 12 | Gesaprim | 2000g/ha | B | 5.6- | 0b | 0.8a | 3.1bcd | 0.4a |
| | Dual Gold | 500ml/ha | D | | | | | |
| 13 | Valor | 210g/ha | A | 5.9- | 0b | 0.0cd | 0f | 0e |
| 14 | Valor | 210g/ha | A | 5.0- | 0b | 0.1cd | 0.5def | 0.0de |
| | Dual Gold | 500ml/ha | C | | | | | |
| 15 | Valor | 210g/ha | A | 5.9- | 0b | 0d | 0.2ef | 0e |
| | Dual Gold | 500ml/ha | D | | | | | |
| 16 | Valor | 210g/ha | B | 5.8- | 0b | 0.1cd | 0.2ef | 0e |
| 17 | Valor | 210g/ha | B | 5.6- | 0b | 0d | 0.1ef | 0e |
| | Dual Gold | 500ml/ha | C | | | | | |
| 18 | Valor | 210g/ha | B | 5.6- | 0b | 0d | 0.2ef | 0e |
| | Dual Gold | 500ml/ha | D | | | | | |
| 20 | Dual Gold | 500ml/ha | C | 6.0- | 0b | 0.1cd | 3.7abc | 0.3abc |
| 21 | Dual Gold | 1500ml/ha | C | 5.8- | 0b | 0.3a-d | 6.5ab | 0.4a |
| 22 | Dual Gold | 500ml/ha | D | 5.6- | 0b | 0d | 7.3ab | 0.1b-e |
| 23 | Dual Gold | 1500ml/ha | D | 5.4- | 0b | 0.5abc | 3.2bcd | 0.1de |
| LSD P=,05 | | | | nsd | 0.09 | 0.271t | 0.916t | 0.159t |
| Treatment Prob.(F)= | | | | 0.4768 | 0.0416 | 0.0060 | 0.0001 | 0.0011 |

Means followed by same letter do not significantly differ (P=.05, LSD)

t=Mean descriptions are reported in transformed data units, and are not de-transformed.

Mean comparisons performed only when AOV Treatment P (F) is significant at mean comparison OSL.

nsd = no significant difference

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Trial ID: LB2109

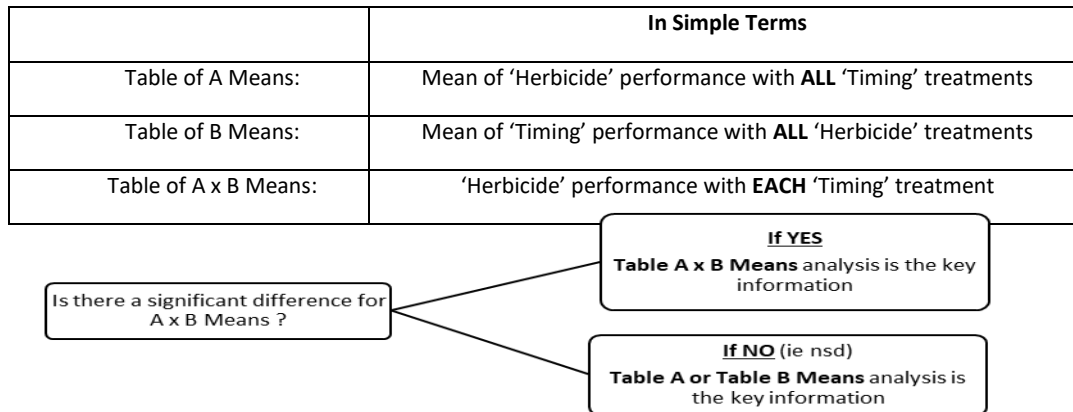
Location:

St Ruth

Trial Year: 2021

The trial was designed with a factorial series of treatments (treatments 1-18) and 5 check treatments (treatments 19-23). The analysis below highlights the performance of the fallow herbicides applied alone or with a following 'top up' treatment of Dual Gold. **NB All treatments have the additional commercially applied Dual Gold 500 mL/ha at planting.**

Key points when data analysed as a factorial



| Scientific Pest Name | | | | <i>Chloris virgata</i> | <i>Conyza bonariensis</i> | <i>Sonchus oleraceus</i> |
|-------------------------------------|-----------------------------|--------------|-------------|------------------------------------|------------------------------------|------------------------------------|
| Pest Name | | | | Feathertop Rhodes Grass | Flaxleaf Fleabane | Common Sowthistle |
| Assessment Date | | | | 2/2/2022 | 2/2/2022 | 2/2/2022 |
| Assessment Type | | | | COUNT | COUNT | COUNT |
| Assessment Unit | | | | /m ² | /m ² | /m ² |
| Weed Stage | | | | GS14-71 | ~ 4-7 leaf | ~ 5-7 leaf |
| Assessed Area | | | | 10 m x 0.9 m | 10 m x 0.9 m | 10 m x 0.9 m |
| Treatment-Evaluation Interval | | | | 187 DAA/159 DAB/ 93 DAC/ 51 DAD | 187 DAA/159 DAB/ 93 DAC/ 51 DAD | 187 DAA/159 DAB/ 93 DAC/ 51 DAD |
| ARM Action Codes | | | | AS | AS | AS |
| Trt No. | Treatment | Product Rate | Appln. Code | | | |
| TABLE OF A MEANS (Herbicide) | | | | | | |
| 1 | Dual Gold | 1000ml/ha | | 0.1b | 5.7a | 0.2a |
| 2 | Gesaprim | 2000g/ha | | 0.4a | 3.9b | 0.3a |
| 3 | Valor | 210g/ha | | 0.0b | 0.2c | 0.0b |
| TABLE OF B MEANS (Timing) | | | | | | |
| 1 | Herbicides alone end-July | - | A | 0.2- | 2.6t- | 0.1- |
| 2 | Herbicides end-July | | A | 0.1- | 3.2t- | 0.1- |
| | Dual Gold | 500ml/ha | C | | | |
| 3 | Herbicides end-July | | A | 0.2- | 3.3- | 0.2- |
| | Dual Gold | 500ml/ha | D | | | |
| 4 | Herbicides alone end-August | | B | 0.1- | 2.0- | 0.2- |
| 5 | Herbicides end-August | | B | 0.2- | 3.2- | 0.2- |
| | Dual Gold | 500ml/ha | C | | | |
| 6 | Herbicides end-August | | B | 0.3- | 2.4- | 0.2- |
| | Dual Gold | 500ml/ha | D | | | |

Interaction tables not presented as no significant interactions

Feathertop Rhodes Grass Residual Management Strategies

Trial ID: LB2109

Location: St Ruth

Trial Year: 2021

| FACTORIAL/POOLED ERROR AOV <i>Chloris virgata</i> - Feathertop Rhodes Grass 2/2/2022 COUNT /m² 187 DAA AS | | | | | | |
|---|----|----------------|-------------|--------|----------|-----------|
| Source | DF | Sum of Squares | Mean Square | F | Prob.(F) | LSD (.05) |
| Total | 71 | 3.428303 | | | | |
| R | 3 | 0.166937 | 0.055646 | 1.650 | 0.1894 | |
| A | 2 | 0.764028 | 0.382014 | 11.327 | 0.0001 | 0.11 |
| B | 5 | 0.145528 | 0.029106 | 0.863 | 0.5124 | 0.15 |
| AB | 10 | 0.631841 | 0.063184 | 1.874 | 0.0710 | 0.26 |
| ERROR | 51 | 1.719968 | 0.033725 | | | |

| FACTORIAL/POOLED ERROR AOV <i>Conyza bonariensis</i> - Flaxleaf Fleabane 2/02/2022 COUNT /m² 187 DAA AS | | | | | | |
|---|----|----------------|-------------|--------|----------|-----------|
| Source | DF | Sum of Squares | Mean Square | F | Prob.(F) | LSD (.05) |
| Total | 71 | 54.095479 | | | | |
| R | 3 | 0.326362 | 0.108787 | 0.388 | 0.7624 | |
| A | 2 | 35.436833 | 17.718417 | 63.136 | 0.0001 | 0.31 |
| B | 5 | 1.313642 | 0.262728 | 0.936 | 0.4656 | 0.43 |
| AB | 10 | 2.705958 | 0.270596 | 0.964 | 0.4853 | 0.75 |
| ERROR | 51 | 14.312684 | 0.280641 | | | |

| FACTORIAL/POOLED ERROR AOV <i>Sonchus oleraceus</i> - Common Sowthistle 2/02/2022 COUNT /m² 187 DAA AS | | | | | | |
|--|----|----------------|-------------|--------|----------|-----------|
| Source | DF | Sum of Squares | Mean Square | F | Prob.(F) | LSD (.05) |
| Total | 71 | 1.281271 | | | | |
| R | 3 | 0.019360 | 0.006453 | 0.487 | 0.6930 | |
| A | 2 | 0.370486 | 0.185243 | 13.971 | 0.0001 | 0.07 |
| B | 5 | 0.074337 | 0.014867 | 1.121 | 0.3610 | 0.09 |
| AB | 10 | 0.140855 | 0.014086 | 1.062 | 0.4077 | 0.16 |
| ERROR | 51 | 0.676233 | 0.013259 | | | |

ARM Action Codes

AS = Automatic square root transformation of X+0.5

DAA = Days After Application A

DAB = Days After Application B

DAC = Days After Application C

DAD = Days After Application D

DAP = Days After Planting

Feathertop Rhodes Grass Residual Management Strategies

Trial ID: LB2109 **Location:** St Ruth **Trial Year:** 2021

Conclusions:

This was a complex trial to evaluate the impact of split or sequential residual herbicide applications for feathertop Rhodes grass (FTR) management both prior to and in sorghum. Dual Gold, Gesaprim or Valor were applied at the end of July or end of August. These treatments either remained as stand-alone or were topped-up with Dual Gold at 1 L/ha, at sorghum planting or early in-crop. Reference treatments were an 'untreated' and Dual Gold rates applied at planting or in-crop.

The trial site was compromised when the grower inadvertently applied Dual Gold at 500 mL/ha shortly before commercial planting as a mixture with glyphosate. Consequently, all treatments in the trial (including the 'untreated') had an extra 500 mL/ha of Dual Gold at planting. The originally planned 'top up' rates of Dual Gold were all reduced by 500 mL/ha.

Levels of rainfall of only ~3-12 mm occurred in the week following each application timing with August and September very dry with <10 mm of monthly rainfall.

At the end of October, MR Taurus sorghum was sown in 90 cm rows into 2020 wheat stubble (~30% ground cover). All treatments were crop safe with no impact on emergence counts or any visual crop effect at 22 days after planting (22 DAP).

Emergence counts for FTR were extremely low. Weed counts at the 2nd application timing (28 DAA) and prior to planting in late October (90 DAA) both showed <0.01 FTR/m². This was very surprising as there was ~60 mm of rainfall recorded ~2 weeks prior to planting. FTR assessment at 22 DAP still showed negligible levels of FTR but this was more expected as all treatments (including the 'untreated') had received at least 500 mL/ha of Dual Gold at planting. Plots were still clean when the in-crop application was conducted.

A final weed assessment was conducted in early February during sorghum grain fill. FTR counts were still very low despite >340 mm of rain after planting. The factorial analysis however clearly showed that fallow treatments of Dual Gold or Valor provided significantly improved FTR control compared to Gesaprim. There were no significant differences between application timings or 'top-up' rates. There were also clear differences in broadleaf weed efficacy apparent at this assessment. Valor provided effective and significantly improved control of flaxleaf fleabane and common sowthistle compared to either Dual Gold or Gesaprim. In addition, Gesaprim provided improved suppression of flaxleaf fleabane compared to Dual Gold but not at a commercially useful level. There were no significant differences evident between application timing or the 'top-up' treatments.

Despite the trial being located in a paddock with a history of FTR issues, emergence of the target weed was very low. The only sound conclusion from this trial is that Gesaprim was inferior to both Dual Gold and Valor for FTR activity. No evaluation could be made on the impact of application timing or the sequential treatment strategies for FTR management. In addition, Valor provided extended and high levels of control of both flaxleaf fleabane and common sowthistle.

Feathertop Rhodes Grass Residual Management Strategies

Trial ID: LB2109 Location: St Ruth Trial Year: 2021

| Crop Description | |
|---------------------|-----------------------|
| Crop & Variety: | Sorghum cv. MR Taurus |
| Planting Date: | 28/10/2021 |
| Planting Rate: | 6,500 seeds/ha |
| Planting Method: | Direct Drilled |
| Planting Equipment: | Disc |
| Row Spacing: | 90 cm |

| Application Description | | | | |
|----------------------------|--------------|------------|-----------|------------|
| | A | B | C | D |
| Application Date: | 30/07/2021 | 27/08/2021 | 1/11/2021 | 13/12/2021 |
| Application Start Time: | 2:50 PM | 10:25 AM | 1:15 PM | 4:30 PM |
| Application Stop Time: | 3:35 PM | 11:05 AM | 1:50 PM | 5:00 PM |
| Application Method: | SPRAY | | | |
| Application Timing: | PRE-EMERGENT | | | POEMCR |
| Application Placement: | SOIL | | | |
| Air Temperature, Unit: | 21.6 C | 15.1 C | 28.9 C | 32.7 C |
| % Relative Humidity: | 45.9 | 43.6 | 40.5 | 36.7 |
| Wind Velocity, Unit: | 11 km/h | 2.1 km/h | 6.9 km/h | 4.9 km/h |
| Wind Direction: | NE | SW | ENE | SW |
| Soil Moisture: | DRY | | | |
| % Cloud Cover: | 0 | 0 | 70 | 50 |
| Next Moisture Occurred On: | 4/08/2021 | 6/09/2021 | 8/11/2021 | 18/12/2021 |

| Crop Stage at Each Application | | | | |
|--------------------------------|-------------------|-----------|-----------------------------|---|
| | A | B | C | D |
| Crop: | Sorghum MR Taurus | | | |
| Stage Majority, %: | Pre-plant | Pre-plant | Post-plant, pre-emergent | GS22 (2 tillers) Delayed by rainfall |

| Application Equipment | | | | |
|---------------------------|----------|---|---|---|
| | A | B | C | D |
| Application Equipment: | Polaris | | | |
| Equipment Type: | BOOM | | | |
| Operation Pressure, Unit: | 300 kPa | | | |
| Nozzle Type: | AIXR | | | |
| Nozzle Size: | 110015 | | | |
| Nozzle Spacing, Unit: | 50 cm | | | |
| Boom Length, Unit: | 4 m | | | |
| Boom Height, Unit: | 50 cm | | | |
| Ground Speed, Unit: | 7.2 km/h | | | |
| Spray Volume, Unit: | 100 L/ha | | | |

Feathertop Rhodes Grass Residual Management Strategies

Trial ID: LB2109

Location:

St Ruth

Trial Year:

2021

Rainfall:

| | |
|---------------------------------|------------------------------------|
| Closest Weather Station: | SIL0 grid pt -27.35, 151.35 |
| Distance: | ~2.1 km |

| Date | Amount | Unit | |
|------------|--------|------|--|
| 30/07/2021 | - | | Application A |
| 4/08/2021 | 2.4 | mm | |
| 5/08/2021 | 0.4 | mm | |
| 16/8/2021 | 0.1 | mm | |
| 24/8/2021 | 5.3 | mm | |
| 27/8/2021 | - | | Application B and 1 st Assessment |
| 5/9/2021 | 0.1 | mm | |
| 6/9/2021 | 2.4 | mm | |
| 17/9/2021 | 0.1 | mm | |
| 21/9/2021 | 1.4 | mm | |
| 28/9/2021 | 1.1 | mm | |
| 29/9/2021 | 0.2 | mm | |
| 30/9/2021 | 2.3 | mm | |
| 1/10/2021 | 4.3 | mm | |
| 2/10/2021 | 2.4 | mm | |
| 7/10/2021 | 0.1 | mm | |
| 12/10/2021 | 7 | mm | |
| 13/10/2021 | 3.3 | mm | |
| 14/10/2021 | 46.7 | mm | |
| 15/10/2021 | 1.9 | mm | |
| 19/10/2021 | 11.8 | mm | |
| 21/10/2021 | 0.1 | mm | |
| 25/10/2021 | 0.2 | mm | |
| 26/10/2021 | 2.5 | mm | |
| 27/10/2021 | 0.6 | mm | |
| 28/10/2021 | - | | Planting (Dual Gold 500 mL/ha over site) 2 nd Assessment |
| 29/10/2021 | 5.1 | mm | |
| 30/10/2021 | 2.8 | mm | |
| 31/10/2021 | 0.1 | mm | |
| 1/11/2021 | 0.1 | mm | Application C |
| 8/11/2021 | 11.8 | mm | |
| 9/11/2021 | 2.9 | mm | |
| 12/11/2021 | 55.4 | mm | |
| 13/11/2021 | 1.1 | mm | |
| 18/11/2021 | 0.8 | mm | |
| 19/11/2021 | 1.3 | mm | 3 rd Assessment |
| 21/11/2021 | 2.6 | mm | |
| 22/11/2021 | 36.2 | mm | |
| 23/11/2021 | 1.5 | mm | |
| 24/11/2021 | 0.1 | mm | |
| 26/11/2021 | 5 | mm | |
| 27/11/2021 | 3.8 | mm | |
| 28/11/2021 | 22.7 | mm | |
| 30/11/2021 | 38.8 | mm | |
| 1/12/2021 | 59.4 | mm | |
| 2/12/2021 | 5 | mm | |
| 5/12/2021 | 5.7 | mm | |
| 6/12/2021 | 0.7 | mm | |
| 9/12/2021 | 15.5 | mm | |
| 10/12/2021 | 6.1 | mm | |
| 13/12/2021 | - | | Application D |
| 18/12/2021 | 3.4 | mm | |

Feathertop Rhodes Grass Residual Management Strategies

Trial ID: LB2109 Location: St Ruth Trial Year: 2021

| Date | Amount | Unit | |
|------------|--------|------|----------------------------|
| 19/12/2021 | 0.1 | mm | |
| 23/12/2021 | 8.2 | mm | |
| 25/12/2021 | 5.1 | mm | |
| 26/12/2021 | 1 | mm | |
| 28/12/2021 | 1.7 | mm | |
| 1/01/2022 | 0.4 | mm | |
| 8/01/2022 | 0.1 | mm | |
| 19/01/2022 | 6.8 | mm | |
| 20/01/2022 | 3.2 | mm | |
| 21/01/2022 | 0.7 | mm | |
| 26/01/2022 | 22 | mm | |
| 27/01/2022 | 4.6 | mm | |
| 28/01/2022 | 0.1 | mm | |
| 2/02/2022 | - | | 4 th Assessment |

| Month | Total Rainfall (mm) |
|--------------|---------------------|
| August 2021 | 8 |
| September | 8 |
| October | 89 |
| November | 184 |
| December | 112 |
| January 2022 | 38 |