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Original Article

# Resistance of sorghum hybrids to sorghum aphid

## Resistência de híbridos de sorgo ao pulgão do sorgo

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**Abstract**

The aphid *Melanaphis sorghi* (Theobald) (Hemiptera: Aphididae), which infest the sorghum crop, has been an economically important pest which have been causing severe damage to sorghum crops in Brazil since 2019. These species have been observed mainly at the end of vegetative stage and beginning of reproductive stage of plants. Their high reproductive rate on sorghum raises concerns about these pests. Therefore, the present study aimed to estimate the life expectancy and fertility tables of *Melanaphis sorghi* fed on 15 hybrids of grain sorghum, in order to know the resistance characteristics of these materials and understand how plant resistance can help manage this insect. This study was carried out in a laboratory at 26±2 ºC and 60±10% R.H (relative humidity). Fifty insects were kept in each hybrid, each insect was considered one repetition. According to biological parameters and fertility life table, hybrids BRS373, DKB590 and 50A10 were less suitable for the sugarcane aphid multiplication. Thus, these hybrids could be useful to manage this pest, since the population growth speed is one of the worst problems for the implementation of cropping systems. Genotypes AG1090, MSK327 and XGN1305 favored the development of this pest and, when chosen within a cropping system, other management strategies should be considered.

**Keywords:** aphid sorghum, biology insect, hybrids, *Melanaphis sorghi*, sorghum.

**Resumo**

O pulgão *Melanaphis sorghi* (Theobald) (Hemiptera: Aphididae), que infesta a cultura do sorgo, tem sido uma praga economicamente importante que vem causando sérios danos às lavouras de sorgo no Brasil desde 2019. As infestações têm sido observadas principalmente no final do estádio vegetativo e início do período reprodutivo das plantas. A alta taxa de reprodução destes insetos no sorgo aumenta a preocupação com a praga. Nesse sentido, o presente estudo teve por objetivo estimar as tabelas de esperança de vida e fertilidade para *Melanaphis sorghi,* alimentados com quinze híbridos de sorgo granífero, afim de conhecer as características de resistência desses materiais e entender como a resistência de plantas pode ajudar no manejo do inseto. O estudo foi conduzido em laboratório com temperatura de 26±2ºC e UR (Umidade Relativa) de 60±10%, foram mantidos 50 insetos em cada hibrido, cada inseto, considerado uma repetição. Com as estimativas dos parâmetros biológicos e mediante tabela de vida de fertilidade, verificamos que os híbridos BRS373, DKB590 e 50A10 foram menos adequados para a multiplicação da praga o que poderia ser considerado melhor para uso em sistemas de manejo da praga, uma vez que a velocidade de crescimento populacional pode ser vista como um dos piores problemas para implementação do sistema de manejo. Os genótipos AG1090, MSK327 e XGN1305 favoreceram o desenvolvimento da praga e, ao ser escolhido dentro do sistema de produção devem ser considerados outras estratégias de manejo.

**Palavras-chave:** pulgão do sorgo, biologia inseto, híbridos, *Melanaphis sorghi*, sorgo.

## 1. Introduction

The aphid *Melanaphis sorghi* (Theobald) (Hemiptera: Aphididae), which infest the sorghum crop, has been an economically important pest. This insect became the main crop pest in North America including the US, Mexico, and Puerto Rico, in 2013 due to a new haplotype identified (Nibouche et al., 2018; Paudyal et al., 2019), which according to Nibouche et al. (2021) is another species, *Melanaphis sorghi* aphid. Prior to the 2013 aphid invasion of the US, *Melanaphis spp*. the diversity of the species around the world was examined, and aphids were collected on sugarcane and sorghum, the latter classified as multilocus lineage (MLL) —D (Nibouche et al., 2014). Harris-Shultz et al. (2017) collected *Melanaphis* on sorghum at 17 sites and in seven states in the US and found it to be a "superclone".

Samples collected in North America and the Caribbean showed that it was a new pest not yet identified worldwide, which was classified as a "superclone" (MLL-F) (Nibouche et al., 2018). In the US since 2013,

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the "superclone" (MLL-F) (Harris-Shultz and Ni, 2021; Nibouche et al., 2018). Recently, the MLL-C and D aphids were classified as *M. sacchari*, the MLL-A and F aphids were reclassified as *M. sorghi,* (Nibouche et al., 2021). Although the Entomological Society of America did not adopt this change, the common names were also changed and aphids classified as *M. sacchari* have a common name as sorghum aphids and aphids classified as *M. sorghi* are now called sorghum aphids.

In Brazil, similarly to what happened in North America, the damage caused by this pest on sorghum crops 2019 at the states Minas Gerais, São Paulo and Goiás (Mendes et al., 2019; Fernandes et al., 2021) were assigned to *M. sacchari*. However, Nibouche et al. (2021) identified the occurrence of *M. sorghi* in sorghum crops in Brazil. The fact is that this pest has been occurring in several regions where sorghum is cultivated in the country. It causes great damage to crops by infesting at the end of vegetative stage and beginning of the reproductive stage. In periods in which grain sorghum increases in importance in the country, when estimates for harvest increase (+4.0% considering the previous harvest) (CONAB, 2020), concern with the pest becomes even more expressive.

The high reproductive rate of this aphid makes in the main pest of sorghum; because it leads to a reduction in productivity caused by the ov of secreted honeydew, which reduces photosynthetic activity, especially by the accumulation of sooty mold on the leaves (Bowling et al., 2016). In addition, the aphid is also a vector of viruses such as: millet red leaf virus (Blackman and Eastop, 1994; Paray et al., 2011), sugarcane yellow leaf virus in sorghum and sugarcane (Schenck and Lehrer, 2000; Boukari et al., 2021) and sugarcane mosaic virus in sorghum (Setokuchi and Muta, 1993; Chung et al., 2021).

Genetic resistance is the main management strategy to control this pest in countries where it causes economic damage to sorghum crops (Armstrong et al., 2015; Paudyal et al., 2019). Furthermore, historically, plant resistance has been one of the most important methods for managing aphids in sorghum crops worldwide (Lahiri et al., 2021). Resistant plants can be defined as those that, due to their genotypic constitution, suffer less attack or damage when exposed to the same insect population compared to other plants at same conditions (Baldin et al., 2019).

In this sense, given the scarcity of records of the level of resistance of grain sorghum hybrids used in Brazil, this study aimed to evaluate the biological parameters of the aphid *Melanaphis sorghi* in 15 commercial grain sorghum hybrids in the laboratory to verify the resistance level of these hybrids.

## 2. Materials and Methods

The bioassays were conducted in the Laboratory of Ecotoxicology and Management at Embrapa Milho e Sorgo, Sete Lagoas, MG, 19º28'30"S, 44º15'08"W and 732 m of altitude.

### *2.1. Aphids' colony*

The colony of *M. sorghi* was initiated with adults collected in the experimental field of Embrapa Milho e Sorgo. Therefore, Aphids were reared on sorghum leaves kept on agar (20g of agar to 1L of water) inside a Gerbox ® box (1 x 11 x 3.5 cm), until the start of the test. The leaves were changed weekly, and adult females were placed in new boxes using a fine brush. The reproduction of these insects in tropical regions, such as Brazil, occurs asexually, that is, the females give rise to female offspring genetically identical to the mothers, without having been fertilized by a male individual. Aphids have a biological cycle consisting of two phases: The nymphal phase is generally composed of 4 stages of development (instars), undergoing four tegument changes before becoming adults (Mukherjee et al., 2020). One day before the beginning of the tests, adults were individualized in a single box to obtain one-day-old nymphs.

### *2.2. Determination of biological parameters of Melanaphis sorghi*

The bioassay was done in laboratory at a room temperature of 26±2 ºC and 60±10% r.h., where 15 commercial hybrids of grain sorghum (BRS373; DKB590; AG1090; MSK327; 50A10; 50A40; 50A70; 70G70; XGN1305; 80G20; MSK326; XB6022; AG1080; A9735R and A6304) were tested. Sorghum leaves of these genotypes were collected in field, and cut (in leaf discs of 3.8 mm in diameter) according to the methodology used by Alcantra et al. (2019) and Ulusoy et al. (2018).

One-day-old nymphs were placed individually on the center of each leaf disc, and placed in 50 mL containers containing agar. Females were evaluated for daily fertility during the pre-reproductive, reproductive and post-reproductive periods. For each hybrid, 50 insects were observed (replicates) until their death. To determine the pre-reproductive period, we observed the nymph (one day old) from the first day of the bioassay until it generated its first offspring. After the beginning of the reproductive period, the offspring generated during the insect's lifetime were quantified and removed. To assess offspring survival, each group of ten individuals was considered a replicate.

### *2.3. Fertility life table*

Fertility life tables are methods used to assess development, fecundity and survival, parameters that are fundamental for understanding the dynamics of populations of an organism (Medeiros et al., 2017). Based on data on longevity, survival and number of nymphs born to each female of *M. sorghi,* the life and fertility table was created. The average number of nymphs born per female on day (mx) on each day of the observation period (x) was calculated considering the total number of females alive on day (lx) during the reproductive period. These values constituted the columns of the life tables. A fertility life table was calculated by estimating the mean generation time (T); the net reproductive rate ($R_0$), which represents the total number of offspring that an individual can produce during its lifetime; the intrinsic rate of increase ($r_m$), which corresponds to the number of nymphs/female/day; the finite rate of increase (λ), defined as the number of times that the population multiplies in a unit of time; and the population doubling time (i.e. time needed for the population to double in number of individuals) (DT), according to the methodology used by Lopes-da-Silva et al. (2014) and Godoy and Cividanes (2002), where (Equations 1-5):

$$R_o = \Sigma\left(m_x.l_x\right) \quad (1)$$

$$T = \left(\Sigma m_x.\, l_x.x\right) / \left(\Sigma m_x.\, l_x\right) \quad (2)$$

$$r_m = log_e R_0 \,/\, T = ln\ R_0 \,/\, T \quad (3)$$

$$\lambda = e^{rm} \quad (4)$$

$$DT = In\left(2\right) / r_m \quad (5)$$

Where: $m_x$= number of offspring per female at stage x (specific fertility) that will produce females; $l_x$= proportion of live females (survival rate) from birth to age x; $m_x$. $l_x$ = total nymphs per female during a time span.

### *2.4. Data analysis*

The biological variables of *M. sorghi* in the fifteen sorghum grain hybrids were used in the fertility life table. Using the values of age intervals (x), specific fertility (mx) and survival probability (lx) of fertility, the life tables were calculated the time interval between each generation (T), the reproductive rate network (R0), the innate ability to increase in number (rm), the finite rate of increase (λ), the time required for the population to double in number of individuals (TD) using Excel software.

The results were submitted to analysis of variance (Table 3) individually, and to assess survival, each group of ten individuals was considered a repetition. When significant differences occurred, identified by the F test (P < 0.05), the mean comparison was performed using the Scott- knott (P < 0.05) with the aid of the SISVAR statistical program (Ferreira, 2011).

## 3. Results

The exclusive feeding on different sorghum hybrids altered the pre-reproductive period of *M. sorghi* (P<0.001; F=13.398), creating five groups of hybrids regarding the duration of this period (Table 1, Figure 1). The shortest mean pre-reproductive period was 4.63 (±0.11) days on hybrid 50A40. The longest was 5.94 (±0.08) days on hybrid BRS 373; a difference of 1.31 days between these two hybrids. The pre-reproductive periods of the sorghum aphid were different among genotypes (Table 1). Hybrids BRS373; DKB590; MSK326; AG304; AG1080 and XB6022 delayed the insects' development; the aphids took 5.65 days on average to develop into adults.

There was also a significant difference (P<0.001; F=3.661) in the reproductive period of aphids when kept in different sorghum hybrids. However, for this variable it was possible to observe only the formation of two groups, the first resulted in a longer reproductive period of 14.40±0.93 days (five hybrids) and the second in a shorter reproductive period of 10.10±1.03 days (10 hybrids) (Table 1, Figure 1).

The hybrid significantly influenced the number of nymphs produced by females (P<0.001; F=4.392) (Table 1). Females maintained on genotypes 50A40 and BRS373 had

**Table 1.** Biological variables (mean ± SE) of *Melanaphis sorghi* fed on 15 sorghum hybrids.

| Hybrid | Pre-reproductive period (days) | Reproductive period (days) | Nymphs/female | Mortality (%) | Nymphs/day Ns* |
|---|---|---|---|---|---|
| **BRS373** | 5.94±0.08 a | 10.75±1.73 b | 57.03±0.27 c | 22.00±3.74 c | 5.69±2.42 |
| **DKB590** | 5.70±0.19 b | 12.25±1.37 b | 75.00±0.20 a | 56.00±5.10 a | 6.14±4.94 |
| **AG1090** | 5.05±0.05d | 13.85±1.71 a | 81.92±0.33 a | 18.00±3.74 c | 6.12±3.84 |
| **MSK327** | 5.13±0.05d | 14.40±0.93 a | 76.44±0.28 a | 6.00±4.00 c | 5.71±4.81 |
| **50A10** | 5.05±0.08d | 13.10±0.79 a | 68.25±0.19 b | 58.00±8.60 a | 5.57±6.32 |
| **50A40** | 4.63±0.11d | 10.10±1.03 b | 54.13±0.1 c | 38.00±12.41 b | 5.59±5.20 |
| **50A70** | 5.14±0.12e | 12.79±1.43 b | 63.81±0.32 b | 12.00±2.00 c | 5.22±1.41 |
| **70G70** | 5.12±0.05d | 11.53±1.65 b | 68.81±0.28 b | 14.00±4.00 c | 6.10±4.46 |
| **XGN1305** | 5.45±0.00 d | 13.38±1.84 a | 75.43±0.31 a | 16.00±5.10 c | 5.73±4.58 |
| **80G20** | 5.14±0.05d | 12.40±1.50 b | 68.67±0.34 b | 14.00±5.10 c | 5.80±4.41 |
| **MSK326** | 5.70±0.11 b | 11.93±1.60 b | 67.38±0.24 b | 18.00±3.74 c | 5.65±2.56 |
| **XB6022** | 5.36±0.09 c | 11.96±2.02 b | 71.57±0.31 a | 4.00±4.00 c | 6.09±3.18 |
| **AG1080** | 5.45±0.07 c | 12.16±1.62 b | 72.32±0.27 a | 8.00±3.74 c | 5.98±4.58 |
| **A9735R** | 5.34±0.08 c | 15.40±1.50 a | 80.77±0.33 a | 4.00±2.45 c | 5.43±4.90 |
| **A6304** | 5.63±0.14 b | 11.92±1.24 b | 66.58±0.24 b | 20.00±6.32 c | 6.31±5.05 |

Means followed by the same letter in the columns do not differ from each other by the Scott-Knott test (P>0.05). *NS = not significant.

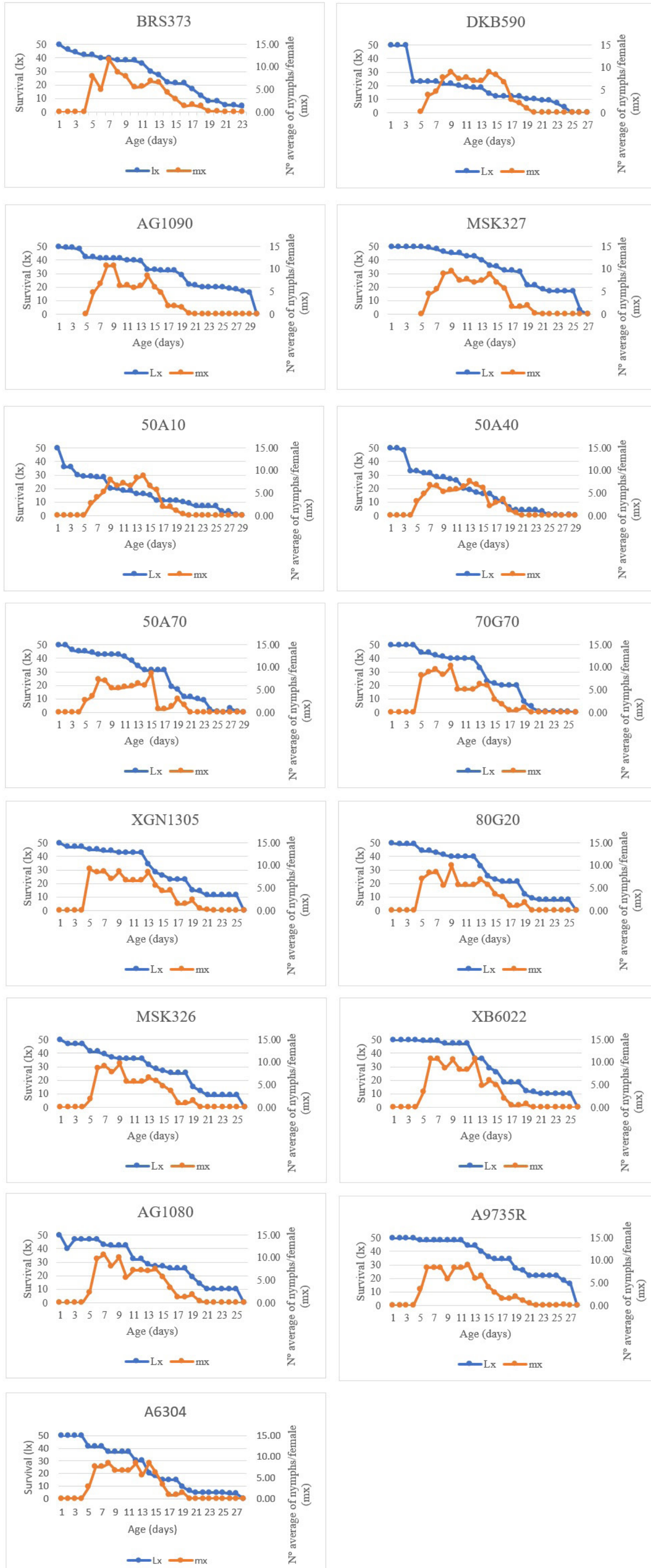


**Figure 1.** Survival rate ($l_x$) and mean number of nymphs/female ($m_x$) of the *Melanaphis sorghi* on 15 hybrids of grain sorghum.

the lowest mean number of nymphs during the reproductive period, 54.13 (±0.10) and 57.03 (±0.27) nymphs per female, respectively, showing that the genotypes interfere with the reproduction of these insects.

There was also a significant difference in mortality in the nymphal stage (Table 1). Hybrids 50A10 and DKB590 showed the highest mortality rates of 58% and 56%, respectively. The 50A40 hybrid presented a mortality of 38% and the others presented a mortality percentage equal to or less than 22% ($P<0.001$; $F=9.963$).

On the other hand, there was no significant difference for the number of nymphs produced per day on each hybrid ($P=1.051$; $F=0.4010$) (Table 1). On average, 5.81 nymphs were produced per day regardless of the hybrid on which the aphid developed. The mean pre-reproductive period of *M. sorghi* on the 15 hybrids was five days, whereas the reproductive period lasted from the 5th to the 15th day (Figure 1). The highest specific fertility ($m_x$) was observed on hybrids BRS 373, AG1090, XB6022 and AG1080 between the 7th and 12th day, when females reached their reproductive peak. Subsequently, a reduction in reproduction was noted due to the female's advancing age. Also, there was a decrease in the survival curve of *M. sorghi* related to the females' longevity ($l_x$) on all hybrids, which also gradually decreased (Figure 1).

The mean generation time (T), in other words, the time between the parents' and the descendants' birth, was greater on hybrids DKB590 (10.57 days), AG1090 (10.41 days), MSK327 (10.56 days), and 50A10 (10.62 days). The lowest mean generation times were 8.45, 8.88, 8.91 and 9.12 days on hybrids 70G70; XB6022; 80G20 and XGN1305, respectively (Table 2).

As table life parameters its use to give the information's about the insect in these hybrids, we found eh reproductive rates (Ro), The intrinsic rate of increase ($r_m$) finite rate of increase ($\lambda$) and time to doubling the population (DT) and it's in the Table 2, and complete the information about them.

## 4. Discussion

The study of life table parameters is a complementary way of evaluating the resistance of sorghum hybrids in relation to the aphid *M. sorghi*, understanding which

**Table 2.** Life table parameters of *Melanaphis sorghi* on 15 grain sorghum hybrids.

| Hybrid | T | $R_o$ | $r_m$ | $\lambda$ | DT |
|---|---|---|---|---|---|
| | (days) | (female) | (female/day) | (female/female/day) | (days) |
| **BRS373** | 9.43 | 42.86 | 0.40 | 1.49 | 1.74 |
| **DKB590** | 10.57 | 29.6 | 0.32 | 1.38 | 2.16 |
| **AG1090** | 10.41 | 63.00 | 0.40 | 1.49 | 1.74 |
| **MSK327** | 10.56 | 69.54 | 0.40 | 1.49 | 1.73 |
| **50A10** | 10.62 | 27.54 | 0.31 | 1.37 | 2.22 |
| **50A40** | 9.71 | 33.98 | 0.36 | 1.44 | 1.91 |
| **50A70** | 10.09 | 52.09 | 0.39 | 1.48 | 1.77 |
| **70G70** | 8.45 | 59.56 | 0.48 | 1.62 | 1.43 |
| **XGN1305** | 9.12 | 69.57 | 0.47 | 1.59 | 1.49 |
| **80G20** | 8.91 | 58.38 | 0.46 | 1.58 | 1.52 |
| **MSK326** | 9.42 | 53.46 | 0.42 | 1.53 | 1.64 |
| **XB6022** | 8.88 | 76.01 | 0.49 | 1.63 | 1.42 |
| **AG1080** | 9.30 | 64.42 | 0.45 | 1.56 | 1.55 |
| **A9735R** | 9.89 | 76.50 | 0.44 | 1.55 | 1.58 |
| **A6304** | 9.30 | 51.80 | 0.42 | 1.53 | 1.63 |

T = mean generation time; $R_o$ = net reproductive rate; $\lambda$ = finite rate of increase; $r_m$ = intrinsic rate of increase; DT = population doubling time.

**Table 3.** Summary of analysis of variance biological variables (mean ± SE) of *Melanaphis sorghi* fed on 15 sorghum hybrids.

| Source | DF | Pre-reproductive period (days) | Reproductive period (days) | Nymphs/ female | Mortality (%) | Nymphs/day Ns |
|---|---|---|---|---|---|---|
| Hybrids | 14 | 3.97** | 73.96** | 2216.45** | 1455.62** | 3.58 NS |
| Error | 561 | 0.29 | 20.27 | 519.82 | 146.09 | 3.35 |
| Average | | 10.32 | 35.71 | 32.42 | 33.81 | 31.57 |
| Cv(%) | | 5.30 | 12.61 | 70.32 | 4.11 | 5.80 |

DF = degrees of freedom; Cv = coefficient of variation; NS = not significant. **Significant at 1% by the F test.

one has the greatest influence on the insect's biology. Plants can use different strategies to resist the attack of insect pests. This mechanism which can be expressed by the antibiosis, were the plant exerts adverse effect to the biology of the insect, which can be a metabolite that causes insect intoxication, or reducing the digestive capacity or perhaps a phytohormone secreted by the plant that interferes with the hormonal process of these insects. These can accelerate, delay or even preventing metamorphosis, in addition to causing negative effects on fecundity and fertility. The defense by the antixenosis mechanism, causes adverse effects on the behavior of the insect towards the plant, these can be biophysical or biochemical factors that aim to prevent the colonization of the pest in the plant. The resistance expressed by the tolerance mechanism is characterized by its recovery process to the attack of herbivores or by its tolerance to the attack, these can be expressed through the regeneration of damaged tissues, tillering, increase in the number of reproductive structures, among others, in a way not to jeopardize their productive potential (Baldin et al., 2019).

Understanding the biological and behavioral aspects of insects are of fundamental importance to comprehend the insects' responses to trophic interactions. In addition, they can also help to characterize the susceptibility and/or resistance of cultivars of a particular crop, and have a direct influence on integrate pest management (Baldin et al., 2019; Silva, 2020).

The use of resistant cultivars to *M. sorghi* is an important tool for the sustainable production of sorghum and has been the basis of pest management in countries such as the USA and Mexico (Armstrong et al., 2015; Paudyal et al., 2019; Tetreault et al., 2019).

Considering the biological parameters of the sorghum aphid, the hybrids DKB590 and 50A10 were more resistant, due to the reduced reproductive capacity of this insect and the higher juvenile mortality when compared to the hybrids evaluated. In addition to inhibiting the aphid's development, these hybrids also were less susceptible to nymphs' multiplication.

The intrinsic rate of increase ($r_m$) is a good indicator of antibiosis in aphids, as low $r_m$ values indicates that a plant has characteristics of resistance (Armstrong et al., 2015; Lama et al., 2019; Paudyal et al., 2019). Souza and Davis (2021), in characterization of sorghum strains, showed that aphids showed lower rm values in the sorghum genotypes resistant to aphids PI 524770 (rm = 0.29), PI 564163 (rm = 0.27) and PI643515 (rm = 0.32) compared to susceptible genotypes (Souza and Davis, 2021). Armstrong et al. (2017) evaluated the resistance of grain sorghum lines B11055 (rm = 0.21) and R13219 (rm = 0.20), and suggested a great resistance potential of these genotypes for breeding programs. In this study, the values of rm in sorghum hybrids DKB590 (rm = 0.32) and 50A10 (rm = 0.31) were the lowest, indicating a possible resistance mechanism in these hybrids.

With the objective of evaluating the resistance of sugarcane cultivars to the sugarcane yellow leaf virus (SCYLV) and its aphid vector, *Melanaphis sacchari* (Rodrigues, 2015), carried out an experiment where it was possible to observe a significant reduction in the population of *M. sacchari* fed with cultivar R365. That may be to resistance mechanisms, since the insects were unable to insert their mouthparts to suck the phloem sap, which directly affected their diet, impairing their development when kept in this cultivar. It's hypothesized that some of the genotypes used in this trial adopted strategies that conferred resistance traits to the insect, which are physical, chemical and or morphological, but the traits that conferred resistance were not evaluated in isolation.

In this sense, the longer the insects take to reproduce (pre-reproductive period) the better for the sorghum hybrid, as the aphid population will be stagnant. We found pre-reproductive period values ranging from 5.94 (±0.08) in the hybrid BRS 373 to 4.63 (±0.11) in the hybrid 50A10. In agreement, Souza and Davis (2020) reported pre-reproductive period values similar to those in the present study, when he fed *M. sacchari* on the cultivar Pioneer 85G8. The pre-reproductive duration in this hybrid was 4.8 (±0.1), 4.8 (±0.1) and 5.9 (±0.1), at 25ºC, 30ºC and 32ºC, respectively. This indicates that our data are consistent with others reported with the same species. When the insect normally feeds on the plant, but this causes an adverse effect on insect biology, such as reproduction, they are influenced by the mechanism of resistance by antibiosis (Payán-Arzapalo et al., 2021).

Therefore, the pre-reproductive period of aphids in general can be affected by plant resistance, being an indicator of host plant susceptibility (Lopes-da-Silva et al., 2014). Thus, in general, the faster the nymph goes through the pre-reproductive phase, the more susceptible the hybrid can be considered in relation to the others, as it may possibly be cooperating with the insect's development.

*Melanaphis sorghi* has a faster pre-reproductive development period in sorghum than in sugarcane. In the present study, the period was 5.29 days, which corroborates the data found by Souza and Davis (2019) where they evaluated the performance of the aphid in different sorghum species where they found a 4-day pre-reproductive period of the aphid in the sorghum cultivar Pioneer 85G85. When evaluating the growth potential of this species in sugarcane cultivar RB867515 by Lopes-da-Silva et al. (2014), the duration of the pre-reproductive period was 9.3 (±0.50). Therefore, our results are compatible with studies related to the performance of *M. sorghi* in sorghum. The results found show that the species has a very fast development, which is harmful for the producer, because if it does not have an efficient management program, the crop will be quickly taken over by aphids.

According to the estimates of biological parameters and the life table and fertility, the hybrids BRS373, DKB590 and 50A10 affected the multiplication of this aphid. Therefore, they can be used in pest management programs, since the speed of population growth can be seen as one of the biggest problems for the implementation of cropping systems. On the other hand, the genotypes AG1090, MSK327 and XGN1305 favored the development of this pest and, when chosen within the production system, other management strategies must be considered. Our results need to be validated in the field to confirm the hypotheses raised here. However, studies are just beginning with this pest species in Brazil. Thus, our results will be useful both for choosing hybrids and to associate this pest biology with strategies to manage it.

## 5. Conclusions

*Melanaphis sorghi* its able to complete its life cycle in different grain sorghum hybrids used in the present study. However, the hybrids BRS373, DKB590 and 50A10 modify and reduce the development of this pest, being more resistant to the aphid, which can help the producer in pest management. On the other hand, the development of that aphid is support in the hybrids AG1090, MSK327 and XGN1305, thus being more susceptible to the aphid.

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