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# GERMINATION PERFORMANCE OF DIFFERENT SORGHUM CULTIVARS UNDER SALINE CONDITIONS

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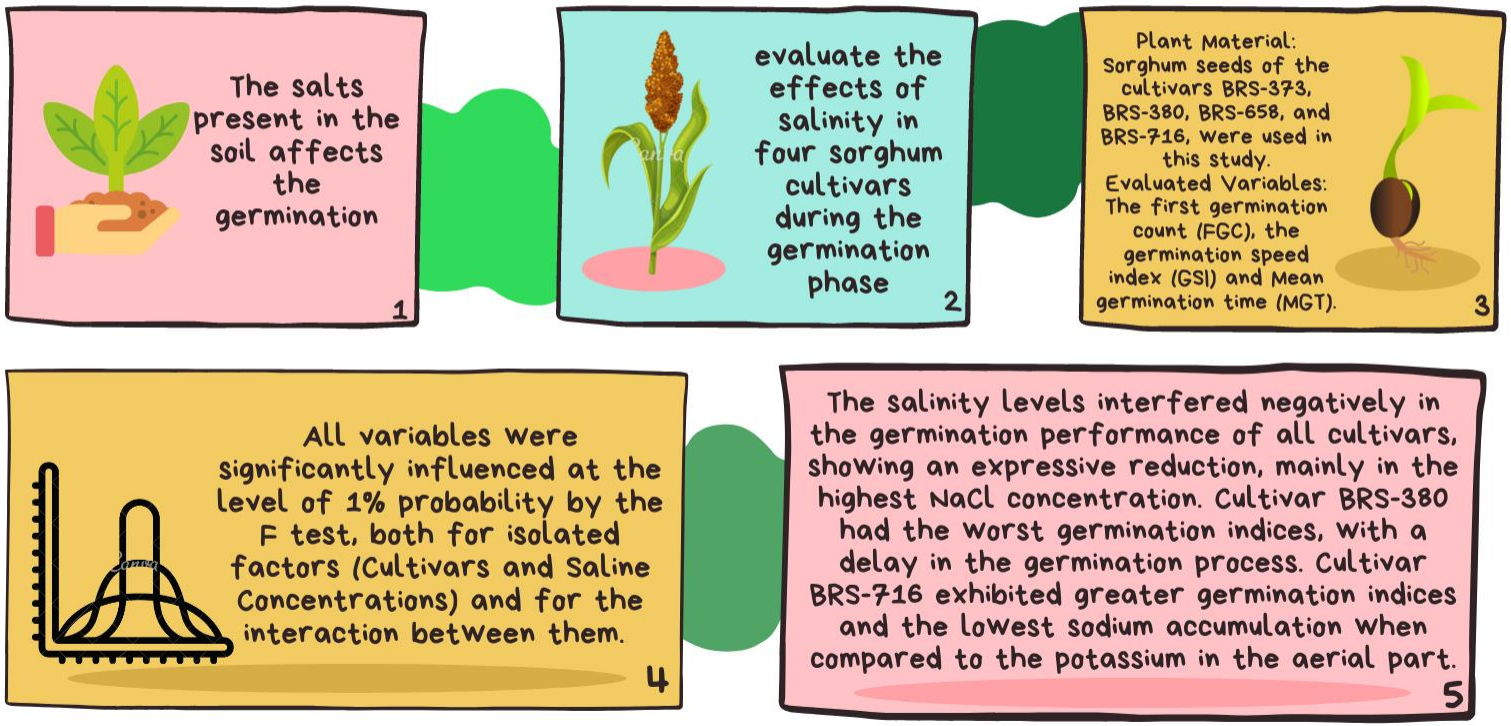
VISUAL ABSTRACT

# GERMINATION PERFORMANCE OF DIFFERENT SORGHUM CULTIVARS UNDER SALINE CONDITIONS

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**Abstract:** This study aimed to evaluate the influence of salinity in the germination of four sorghum cultivars. The experimental design used was completely randomized, in a 4 x 5 factorial arrangement, with four sorghum cultivars (BRS-373, BRS-380, BRS-658, and BRS-716) and five NaCl concentrations (0, 50, 100, 150, and 200mM). The variables investigated were final germination percentage, first count, mean germination time, germination speed index, and sodium and potassium contents (radicle and aerial part). The findings demonstrated that the salinity levels interfered negatively in the germination performance of all cultivars, showing an expressive reduction, mainly in the highest concentration of NaCl.

**Keywords:** *Sorghum bicolor* (L.) Moench; abiotic stress; salinity; germination; seedlings.

# Introduction

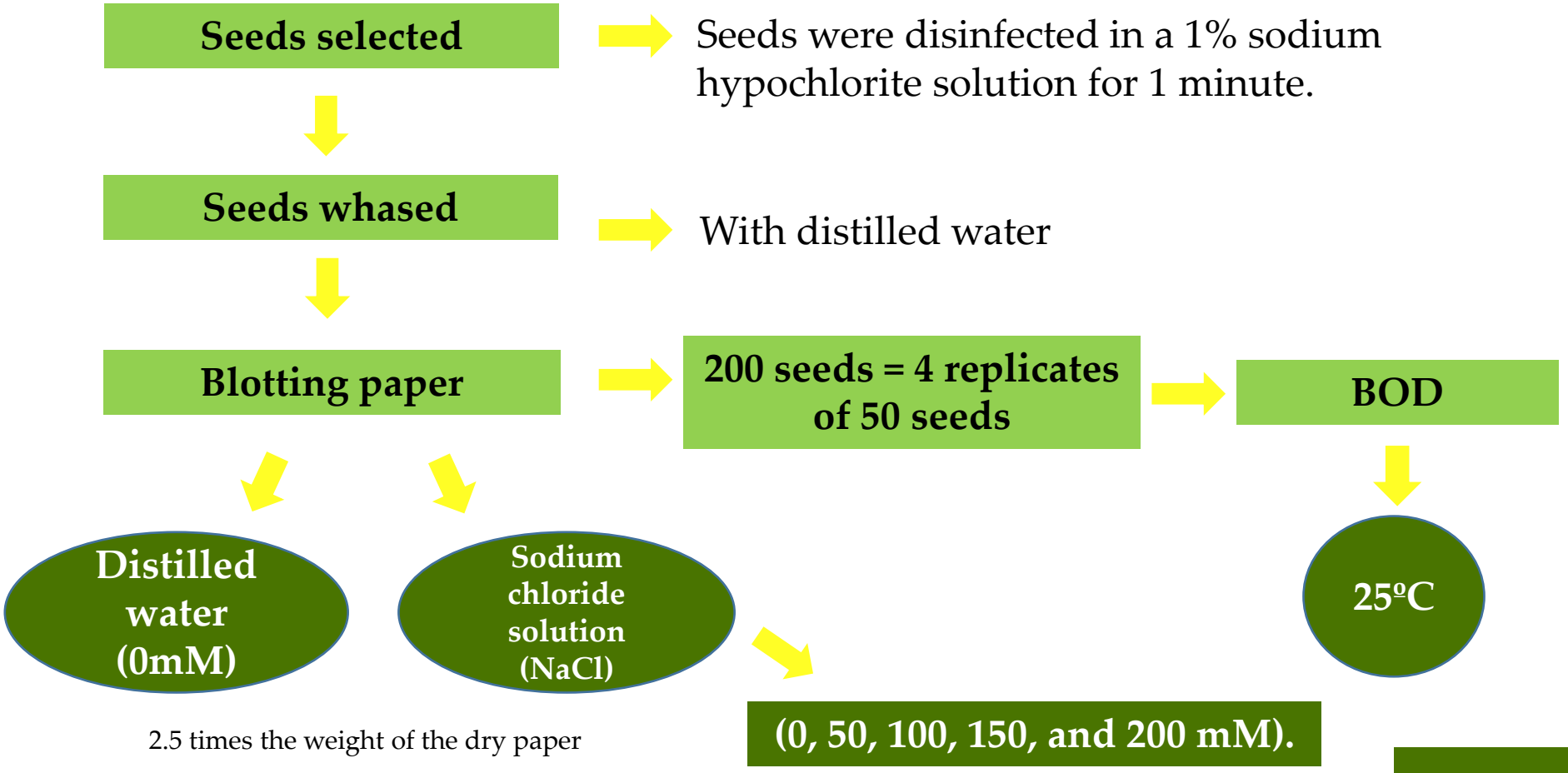
- ✓ Abiotic factors
- ✓ The salts present in the soil affects the germination
- ✓ *Sorghum bicolor* (L.) Moench
- ✓ This study aimed to evaluate the effects of salinity in four sorghum cultivars during the germination phase.

Source: Revista Globo Rural

# Material and Methods

| | |
|---|---|
| Time course | August and September 2020 |
| Located in | Seed Analysis and Plant Physiology Laboratories, belonging to the Department of Plant Science and Biochemistry and Molecular Biology, respectively, of the Federal University of Ceara (UFC), located in Fortaleza, Ceara, Brazil |
| Plant material | Sorghum seeds of the cultivars BRS-373, BRS-380, BRS-658, and BRS-716, were used in this study. |

# Germination Test



# Germination Test


**Germination criterion:** the radicle emission with at least 2.0 mm in length in each treatment

**Evaluated Variables:** Percentage of germinated seeds (G); first germination count (FGC), germination speed index (GSI), mean germination time (MGT), sodium and potassium ratio in the radicle ($Na_+/K^+$ Ra) and aerial part ($Na_+/K^+$ Pa) of four sorghum cultivars submitted to five NaCl concentrations. .

# Experimental design

Completely randomized, in a 4 x 5 factorial arrangement

**Sorghum cultivars (BRS-373, BRS-380, BRS-658, and BRS-716)**

**NaCl concentrations (0, 50, 100, 150, and 200 mM)**

**Data were submitted to analysis of variance, and when significant at 1 and 5% by the F test, regression analyzes were performed. For the statistical analysis and plot of the graphics, the computer programs "R" v. 4.0.2 [15] and "SigmaPlot 11.0" (Copyright © 2014 Systat Software Inc.), respectively, were used.**

# Results and Discussion

**Table 1.** Summary of analysis of variance for germination percentage (G), first germination count (FGC), germination speed index (GSI), mean germination time (MGT), sodium and potassium ratio in the radicle ($Na_+/K^+$ Ra) and aerial part ($Na_+/K^+$ Pa) of four sorghum cultivars submitted to five NaCl concentrations. Fortaleza, Ceara, Brazil, 2020.

| Sources of Variation | DF | Medium square | | | | | |
|---|---|---|---|---|---|---|---|
| | | G | FGC | GSI | MGT | $Na^+/K^+$ R | $Na^+/K^+$ AP |
| Cultivares (C) | 3 | 481.65** | 3542.7** | 120.70** | 4.12** | 112.03** | 7.668** |
| Concentrações Salinas (CS) | 4 | 245.80** | 671.0** | 149.99** | 2.80** | 639.81** | 46.491** |
| Int. C x CS | 12 | 29.90** | 47.5** | 0.85** | 0.07** | 24.81** | 1.615** |
| Resíduo | 60 | 8.15 | 21.1 | 0.56 | 0.03 | 2.18 | 0.124 |
| Total | 79 | - | - | - | - | - | - |
| CV % | - | 3.13 | 5.68 | 4.85 | 4.99 | 19 | 11.7 |

DF = Degree of freedom; CV = Coefficient of variation; ** Significant by F test at 0.01; * Significant by F test at 0.05; ns = not significant.

# Results and Discussion

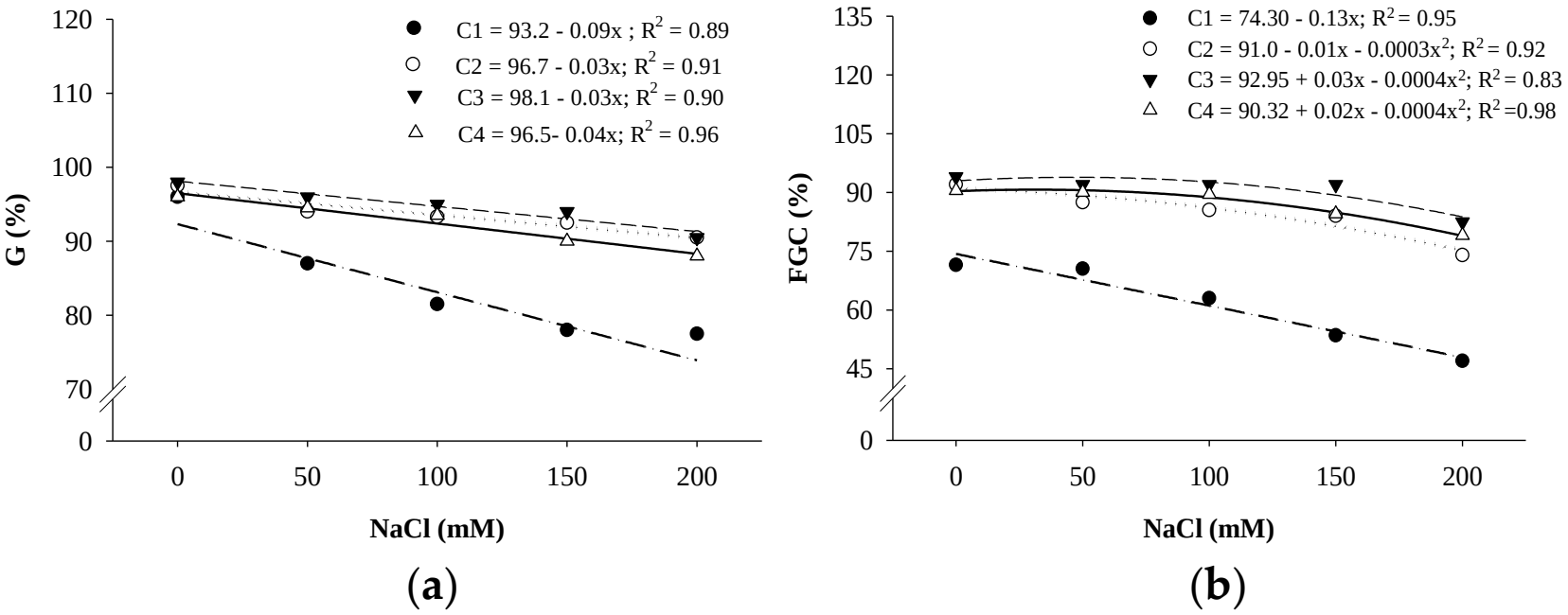



**Figure 1.** (**a**) Final germination percentage (G) and (**b**) First Germination Count (FGC) in seeds of four sorghum cultivars submitted to different saline concentrations. C1: BRS-373; C2: BRS-380; C3: BRS-658; and C4: BRS-716. Fortaleza, Ceará, Brazil, 2020.

# Results and Discussion

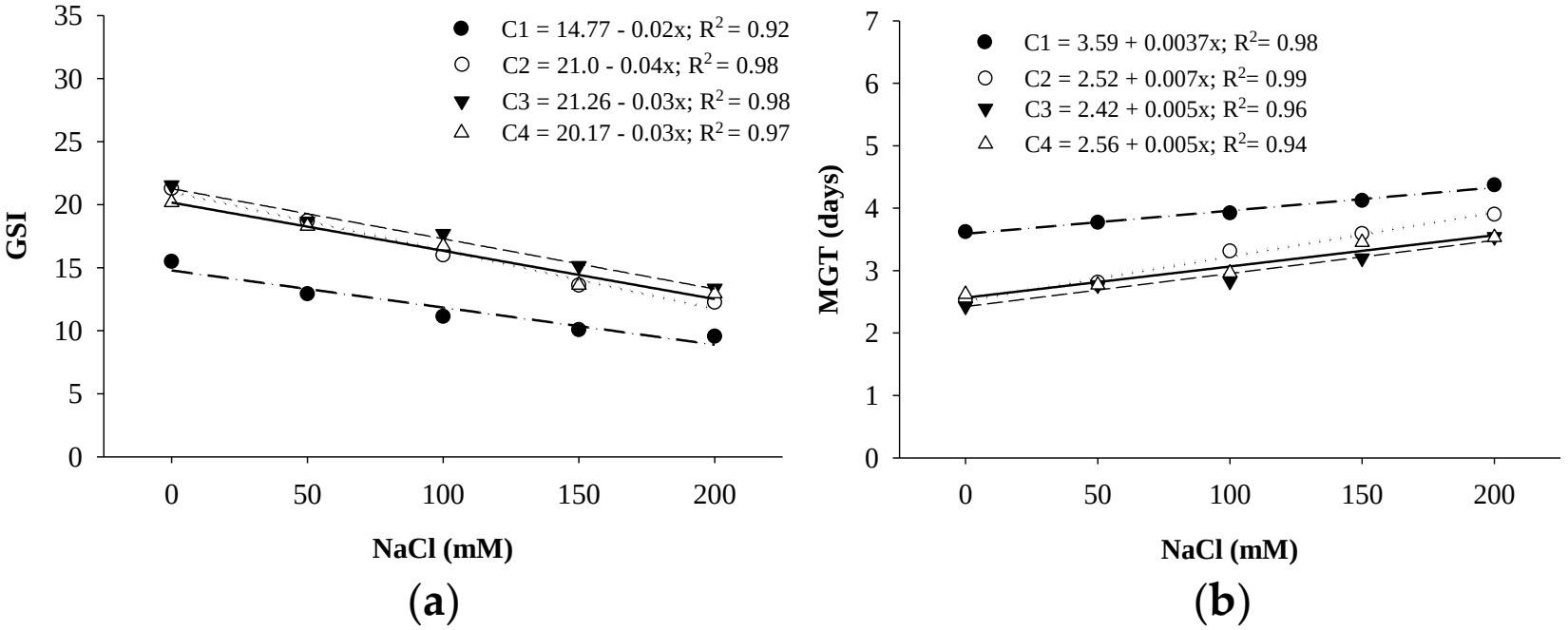



**Figure 2.** (**a**) Germination speed index (GSI) and (**b**) mean germination time (MGT) in seeds of four sorghum cultivars submitted to different saline concentrations. C1: BRS-373; C2: BRS-380; C3: BRS-658; C4: BRS-716. Fortaleza, Ceara, Brazil, 2020.

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# Results and Discussion

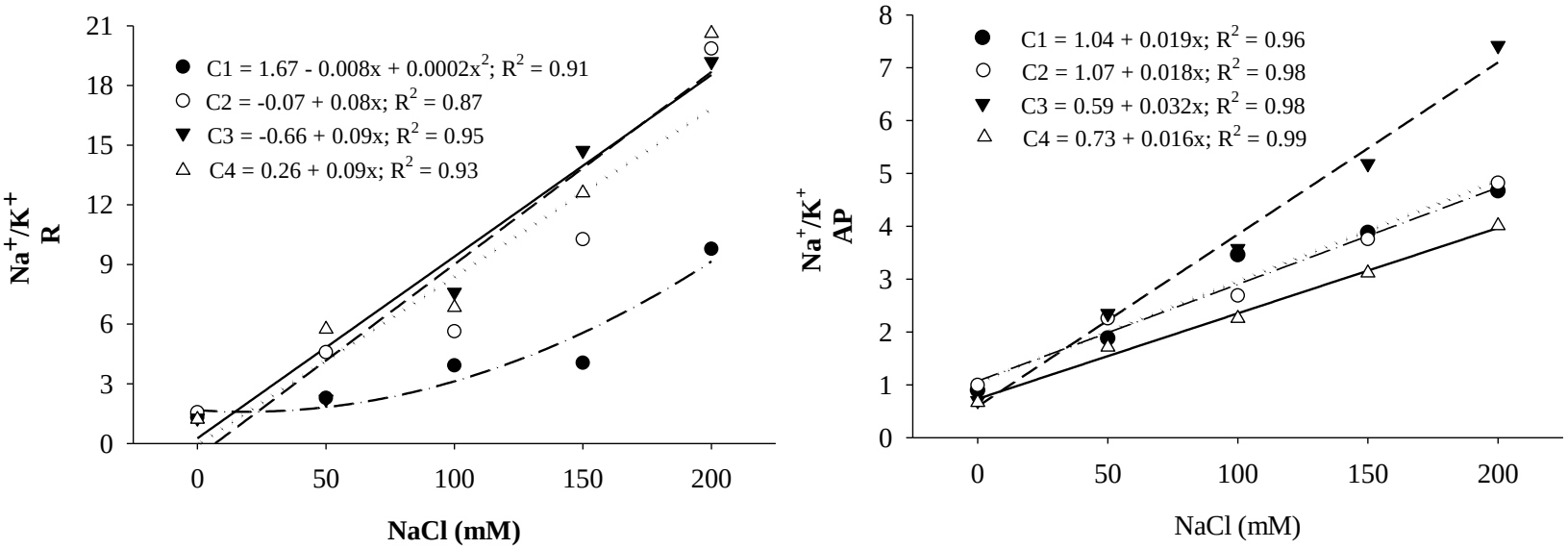


**Figure 3.** (**a**) Sodium and potassium (Na+/K+) ratio in the radicle and (**b**) in the aerial part of four sorghum cultivars submitted to different saline concentrations. C1: BRS-373; C2: BRS-380; and C3: BRS-658; C4: BRS-716. Fortaleza, Ceará, Brazil, 2020.

# Conclusions

The salinity levels interfered negatively in the germination performance of all cultivars, showing an expressive reduction, mainly in the highest NaCl concentration. Cultivar BRS-380 had the worst germination indices, with a delay in the germination process. Cultivar BRS-716 exhibited greater germination indices and the lowest sodium accumulation when compared to the potassium in the aerial part.

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