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# Tolerance of local gogo rice sprouts under salinity stress conditions

*Toleransi kecambah padi gogo lokal pada kondisi tercekam salinitas*

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## ABSTRAK

Perluasan areal tanaman padi dimasa yang akan datang perlu dilakukan di luar jawa karena lahan subur di jawa mengalami penyusutan akibat alih fungsi lahan. Sebagian besar lahan diluar jawa merupakan lahan marginal seperti salinitas tinggi. Tingkat salinitas yang tinggi dalam tanah menyebabkan penurunan perkecambahan, pertumbuhan dan produksi tanaman. Penelitian ini bertujuan untuk mengkaji toleransi setiap kultivar pada setiap taraf kosentrasi NaCl, mendapatkan kultivar yang toleran terhadap cekaman salinitas, dan menentukan kosentrasi NaCl yang menekan perkecambahan padi gogo lokal. Penelitian disusun menggunakan Rancangan Acak Lengkap pola factorial dua factor. Pertama adalah 6 kultivar padi gogo yaitu, dongan, jahara, pulu konta, delima, kalendeng, dan pulu tau leru, sedangkan factor kedua adalah kosentrasi NaCl terdiri atas 0 %, 0,2%, 0,4%, 0,6%, 0,8% dan 1 %. Dengan demikian terdapat 36 unit percobaan yang diulang tiga kali sehingga terdapat 108 unit percobaan. Hasil penelitian menunjukkan bahwa tidak terdapat interaksi terhadap semua peubah perkecambahan, kultivar dan kosentrasi berpengaruh nyata terhadap potensi tumbuh maksimum, daya berkecambah, waktu berkecambah, Panjang plumula, Panjang radikel dan berat kering kecambah sedangkan kultivar berpengaruh terhadap berat basah kecambah. Kalendeng memiliki toleransi yang tinggi terhadap salinitas. Penggunaan kosentrasi NaCl hingga 0,6% telah mampu menurunkan daya berkecambah padi gogo lokal. Kesimpulan dari penelitian menunjukkan tidak terdapat interaksi pada seluruh variable.

Kata kunci: kecambah, padi gogo lokal, salinitas

## ABSTRACT

The expansion of rice planting areas in the future needs to be carried out outside Java, as fertile land in Java is shrinking due to land conversion. Most of the land outside Java consists of marginal land, such as areas with high salinity. High salinity levels in the soil cause a decrease in plant germination, growth, and production. The research aimed to examine the tolerance of each cultivar at each level of NaCl concentration, to obtain cultivars that were tolerant to salinity stress, and to determine the NaCl concentration that suppresses the germination of local upland rice. The research was structured using a completely randomized design with a two-factor factorial pattern. The first was the six upland rice cultivars, namely, dongan, jahara, Pulu Konta, pomegranate, kalendeng, and pulu tau leru, while the second factor was the NaCl concentration consisting of 0%, 0.2%, 0.4%, 0.6%, 0.8% and 1%. Thus, there were 36 experimental units, which were repeated three times so that there were 108 experimental units. The results of the research showed that there was no interaction with all germination variables; cultivar and concentration had a significant effect on maximum growth potential, germination capacity, germination time, plumule length, radicle length and dry weight of sprouts, while cultivar affected the wet weight of sprouts. Kalendeng has a high salinity tolerance. The use of NaCl concentrations of up to 0.6% has been able to reduce the germination capacity of local upland rice. The conclusion of the research showe that there was no interaction between all germination variables.

Keywords: sprouts, local upland rice, salinity

## INTRODUCTION

The number of populations in the world currently consuming rice as a staple crop was four billion people (Korres et al., 2022). Population growth that increases every year based on a series of measurements causes rice crop production to continue to grow. Crop management, effective weed control, and the use of cultivars that are tolerant to abiotic stress are some of the efforts that can be made to ensure higher rice crop production. This condition can meet the demand for rice, both now and in the future (Chauhan et al., 2013).

Rice plants can grow in watery (rice paddy fields) or less wet (rice fields). Currently, the development of rice plants in fertile areas, especially Java, was difficult to expect in the future. This was because fertile land for agricultural use in Java has been reduced due to land use change. Thus, the area of rice plant development needs to be directed outside Java, even though many lands outside Java are marginal, especially salinity.

According to (IIbarra-Villarreal et al., 2021), salinity was where environmental conditions can inhibit growth. In addition, salinity can reduce crop production by up to 65%. Salinity in soil will be able to cause osmotic resistance, ionic resistance and nutrient balance resistance (Anshori et al., 2019; Yuan et al., 2020). In addition, germination barriers in vegetative and generative phases are caused by salinity levels in the soil (Rahman et al., 2016; Maemunah et al., 2023). According to (Purwaningrahayu, 2016), saline land in Indonesia covers an area of 440,300 ha, of which 300,000 ha was classified as somewhat saline while 140,300 ha was included in the saline category. Based on such conditions, it was necessary to take steps in agriculture to take advantage of these conditions by creating plants with tolerance to salty soils. Tolerant plants are widely found in nature in the form of germplasm. Rice germplasm was also found in Central Sulawesi, especially in gogo rice, which was spread in several business areas.

In 2018, an exploration of local gogo rice plants was carried out in several districts in Central Sulawesi. According to (Korres et al., 2022), rice commodities are very sensitive to salinity stress. The results of research by (Zhang et al., 2021) using salt concentrations of 0, 50, 85, 120, 155, 190 and 220 mM showed that the use of NaCl concentrations up to 120 mM caused a decrease in the growth of gogo rice sprouts. The growth of seedlings and the fresh weight of rice plants decreased with an increase in salt pressure from 5 to 7.5 dS/m (Kazemi & Eskandari, 2011). Based on the description above, the objective of this research was to examine the response of each cultivar to each concentration of NaCl, cultivars that have the tolerance to salinity and NaCl concentration that can reduce the germination of gogo rice.

## MATERIALS AND METHODS

### Place and Time

This research was carried out at the Seed Science and Technology Laboratory and at the Screen House of the Faculty of Agriculture, Tadulako University, Palu, from March to June 2023.

### Tools and Materials

The tools used consist of Petri dish dishes, molten paper, analytical scales, tweezers, scissors, aqua glass, tub, germination basket, meter, label paper, menuing stationery, measuring cup, bucket, digital scale, and thermometer. The material consists of local gogo rice seeds, manure, soil, water, and NaCl.

**Research Design**

This study was prepared using a Complete Randomized Design factorial pattern consisting of two factors. The first factor was: 6 local gogo rice cultivars namely: K1 (Dongan), K2 (Pulu tau leru) and K3 (Delima), K4 (Jahara), K5 (Kalendeng), and K6 (Pulu konta). While the second factor was six concentrations of NaCl, namely, 0%, 0.2%, 0.4%, 0.6%, 0.8%, 1%, so that 36 experimental units were each treatment was done in triplicate so that there were 108 experimental units.

Observation Variables

1. Germination time
   Calculated from the first day to the fourteenth day. The count was carried out on the last day of germination.

$$GT = \frac{N1T1 + N2T2 \ldots + NiTi}{Total\ seeds\ germinated}$$

   Information:
   GT = Germination Time
   Ni = Number of seeds germinated at a time
   Ti = Observation Time (days) I =1,2,3....
2. Germination (%)
   Calculated from the first day to the fourteenth day.

$$G = \frac{NGS}{NSG} x100\%$$

   Information:
   NGSN = *the number of germinated seeds was normal*
   NSG = *number of seeds germinated*
3. Maximum Growth Potential (%)
   It was calculated by adding up all germinated seeds and multiplying by 100%, with the formula:

$$MGP\ (\%) = \frac{NGS}{NSG} x100\%$$

   Information:
   MGP = Maximum growth potential
   NGS = Number of germinated seeds
   NSG = Number of seeds germinated
4. Plumule length (cm), measured at the end of the observation, from the base to the tip of the plumule.
5. Radicle length (cm) was measured at the end of the observation by measuring the length of the primary root from the base to the tip of the root. The wet weight of the sprouts (mg) was carried out at the end of the study by weighing the sprouts without cotyledons. The dry weight of sprouts (mg) was carried out at the end of the study by measuring the sprouts without cotyledons and oven at 60°C for 3 x 24 hours.

**Data Analysis**

Data from both stages of the study would be analyzed using variety analysis (Anova). If the variety analysis showed that the treatment has an effect, it will be continued with the 5% HSD test to determine the difference between

## RESULTS

**Growth Potential**

The diversity analysis results showed that cultivars and concentrations of NaCl had a real effect on the change in growth potential intensity, while the intersection had no real effect. The 5% HSD test results showed that the Kalendeng cultivar produced higher growth potential (98.56%), but it was not significantly different from the Pulu tau Leru (95.78%), Pomegranate (95.11%), Jahara (95.11%), and Pulu konta (95.67%) cultivars. The results also showed that without NaCl administration resulted in a higher average value of growth potential (97.67%), but not different from concentrations of 0.2% (97.22%), 0.4% (96.56%), 0.6% (94.78%), 0.8% (94.56%) (Table 1).

**Germination**

The diversity analysis showed that cultivars and NaCl concentrations had a real effect on germination intensity variables, while the interaction had no real effect (Table 2). The HSD test results of 5% showed that Kalendeng cultivars produced higher germination average values (94.22%) but were no different from Dongan cultivars (87.56%) and Pomegranate (89.44%). Treatment without NaCl administration resulted in a higher average germination value (90.78%) but did not differ with concentrations of 0.2% (88.00%), 0.4% (87.56%), 0.6% (86.22%), and concentrations of 0.8% (84.78%).

## Germination Time

The diversity analysis results showed that cultivars and NaCl concentrations had a real effect on the change in germination time, while the interaction had no real effect (Table 3). The 5% HSD test results showed that Kalendeng cultivars produced faster average germination times (2.33 days) but were no different from Dongan (2.46 days), Jahara (2.42 days), and Pulu konta (2.54 days) cultivars. Treatment without NaCl resulted in faster germination time (1.87 days) but did not differ from NaCl concentration of 0.2% (2.14 days).

## Plumula Length

The diversity analysis showed that cultivars and NaCl concentrations had a real effect on the change in plumule length duration, while the interaction had no real effect (Table 4).

The results of the 5% HSD test showed that the Dongan cultivar produced an average value of longer plumula length (7.68 cm), but it was no different from the delima (6.70 cm), Jahara (7.35 cm), Kalendeng (7.14 cm), and Pulu konta (7.33 cm) cultivars. Treatment without using NaCl resulted in a longer mean plumula length value (8.42 cm) but did not differ with NaCl concentrations of 0.2% (7.93 cm) and 0.4% (7.71cm).

Table 1. The average value of growth potential for several local upland rice cultivars was due to the giving of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 97.33 | 95.33 | 95.33 | 93.33 | 93.33 | 85.33 | $93.33_{a}$ | 3.67 |
| Pulu Tau Leru | 96.67 | 96.67 | 96.67 | 95.33 | 94.67 | 94.67 | $95.78_{ab}$ | |
| Delima | 96.67 | 96.67 | 96.67 | 94.00 | 94.00 | 92.67 | $95.11_{ab}$ | |
| Jahara | 98.00 | 97.33 | 95.33 | 94.67 | 93.33 | 92.00 | $95.11_{ab}$ | |
| Kalendeng | 99.33 | 99.33 | 99.33 | 97.33 | 98.00 | 98.00 | $98.56_{b}$ | |
| Pulu Konta | 98.00 | 98.00 | 96.00 | 94.00 | 94.00 | 94.00 | $95.67_{ab}$ | |
| Mean | $97.67_{b}$ | $97.22_{b}$ | $96.56_{b}$ | $94.78_{ab}$ | $94.56_{ab}$ | $92.78_{a}$ | | 3.67 |

Note: Means followed with the same letters within rows or columns were not significantly different based on the HSD at $p < 0.05$

Table 2. The average germination value of several local upland rice cultivars was due to the awarding of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.20% | 0.40% | 0.60% | 0.80% | 1.00% | | |
| Dongan | 88.67 | 88.00 | 91.33 | 90.00 | 87.33 | 80.00 | $87.56_{bc}$ | 11.20 |
| Pulu Tau Leru | 91.33 | 86.67 | 84.67 | 82.00 | 82.00 | 77.33 | $84.00_{b}$ | |
| Delima | 93.33 | 90.67 | 90.00 | 90.00 | 86.67 | 86.00 | $89.44_{bc}$ | |
| Jahara | 90.67 | 88.00 | 86.00 | 85.33 | 85.33 | 82.67 | $86.33_{b}$ | |
| Kalendeng | 96.00 | 94.00 | 94.00 | 94.00 | 94.00 | 93.33 | $94.22_{c}$ | |
| Pulu Konta | 84.67 | 80.67 | 79.33 | 76.00 | 73.33 | 64.00 | $76.33_{a}$ | |
| Mean | $90.78_{b}$ | $88.00_{b}$ | $87.56_{ab}$ | $86.22_{ab}$ | $84.78_{ab}$ | $80.56_{a}$ | | 11.20 |

Note: Means followed with the same letters within rows or columns were not significantly different based on the HSD at $p < 0.05$

Table 3. The average value of germination time for several local upland rice cultivars was due to the allotment of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 1.42 | 1.75 | 2.19 | 3.06 | 3.01 | 3.31 | $2.46_{ab}$ | 0.58 |
| Pulu Tau Leru | 2.56 | 2.60 | 2.92 | 2.89 | 3.19 | 4.00 | $3.03_{b}$ | |
| Delima | 2.06 | 2.40 | 3.85 | 3.16 | 4.46 | 3.79 | $3.29_{b}$ | |
| Jahara | 1.61 | 1.97 | 2.27 | 2.79 | 2.67 | 3.20 | $2.42_{a}$ | |
| Kalendeng | 1.44 | 2.07 | 2.31 | 2.76 | 2.70 | 2.63 | $2.32_{a}$ | |
| Pulu Konta | 2.11 | 2.05 | 2.29 | 2.76 | 2.78 | 3.24 | $2.54_{ab}$ | |
| Mean | $1.87_{a}$ | $2.14_{ab}$ | $2.64_{b}$ | $2.90_{bc}$ | $3.14_{bc}$ | $3.36_{c}$ | | 0.58 |

Note: Means followed with the same letters within rows or columns were not significantly different based on the HSD at $p < 0.05$

## Radikula Length

The diversity analysis results showed that the cultivar and concentration of NaCl had a real influence on the variable of radicule length duration, while the interaction had no real effect (Table 5). The results of the 5% HSD test showed that the cultivar Pulu tau leru produced a longer radicle length (8.83 cm) but was not different from the cultivars Jahara (7.89 cm), Kalendeng (6.98 cm) and Pulu konta (7.32 cm). Treatment without the use of NaCl resulted in a longer average radicle length value (8.61 cm) but did not differ with NaCl concentrations of 0.2% (8.20 cm) and 0.4% (7.90 cm).

## Wet Weight of Sprouts

The diversity analysis results showed that cultivars had a real effect on the change in the severity of wet sprouts, while the concentration of NaCl and its interaction had no real effect (Table 6). The 5% HSD test results showed that the cultivar cultivar Pulu konta produced a heavier wet weight of sprouts (1.39 g) but not different from the Pomegranate cultivar (1.35 g) and Jahara 1.37 g).

## Dry Weight of Sprouts

The results of diversity analysis showed that cultivars and NaCl concentrations had a significant effect on the dry weight change of sprouts, while the interaction had no real effect (Table 7).

The 5% HSD test results showed that the cultivar Pulu konta produced a heavier wet weight of sprouts (0.29 g), but it was no different from the cultivars Jahara (0.24 g) and Kalendeng (0.25 g). Treatment without using NaCl resulted in an average dry weight value of heavier sprouts (0.27 g), but did not differ with concentrations of 0.2% (0.25 g), 0.4% (0.24 g), 0.6% (0.22 g) and 0.8% (0.21 g).

Table 4. The average value of plumule length for several local upland rice cultivars resulting from the administration of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 8.36 | 8.18 | 8.17 | 7.47 | 7.30 | 6.59 | $7.68_{b}$ | 1.19 |
| Pulu Tau Leru | 8.14 | 7.63 | 6.84 | 6.30 | 6.07 | 4.09 | $6.51_{a}$ | |
| Delima | 7.98 | 7.51 | 7.44 | 6.29 | 5.70 | 5.27 | $6.70_{ab}$ | |
| Jahara | 8.50 | 8.39 | 8.27 | 6.76 | 6.16 | 6.03 | $7.35_{ab}$ | |
| Kalendeng | 8.81 | 7.71 | 7.66 | 7.39 | 5.91 | 5.38 | $7.14_{ab}$ | |
| Pulu Konta | 8.76 | 8.14 | 7.91 | 6.81 | 6.37 | 6.00 | $7.33_{ab}$ | |
| Mean | $8.42_{c}$ | $7.93_{bc}$ | $7.71_{bc}$ | $6.84_{b}$ | $6.25_{ab}$ | $5.56_{a}$ | | 1.19 |

Note: Means followed with the same letters within rows or column were not significantly different based on the HSD at $p < 0.05$

Table 5. The average value of radicle length for several local upland rice cultivars resulting from administration of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 7.54 | 6.62 | 6.48 | 6.10 | 5.92 | 4.78 | $6.24_{a}$ | 1.32 |
| Pulu Tau Leru | 10.67 | 10.59 | 9.89 | 8.66 | 7.62 | 5.56 | $8.83_{b}$ | |
| Delima | 7.46 | 7.44 | 7.21 | 6.29 | 5.58 | 4.73 | $6.45_{a}$ | |
| Jahara | 9.42 | 8.71 | 8.27 | 7.46 | 7.23 | 6.28 | $7.89_{b}$ | |
| Kalendeng | 7.81 | 7.71 | 7.66 | 7.39 | 5.91 | 5.38 | $6.98_{ab}$ | |
| Pulu Konta | 8.76 | 8.14 | 7.91 | 6.81 | 6.37 | 5.93 | $7.32_{ab}$ | |
| Mean | $8.61_{c}$ | $8.20_{bc}$ | $7.90_{bc}$ | $7.12_{b}$ | $6.44_{ab}$ | $5.44_{a}$ | | 1.32 |

Note: Means followed with the same letters within rows or column were not significantly different based on the HSD at $p < 0.05$

Table 6. The average value of the wet weight of sprouts for several local upland rice cultivars resulted from the aduction of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 0.29 | 0.66 | 0.71 | 0.96 | 1.21 | 1.26 | $0.85_a$ | 0.24 |
| Pulu Tau Leru | 0.86 | 0.84 | 0.72 | 0.71 | 0.69 | 0.69 | $0.75_a$ | |
| Delima | 1.09 | 1.33 | 1.33 | 1.36 | 1.47 | 1.52 | $1.35_b$ | |
| Jahara | 1.56 | 1.41 | 1.39 | 1.29 | 1.29 | 1.28 | $1.37_b$ | |
| Kalendeng | 0.73 | 0.93 | 0.97 | 1.00 | 1.07 | 1.12 | $0.97_a$ | |
| Pulu Konta | 1.58 | 1.53 | 1.38 | 1.35 | 1.28 | 1.21 | $1.39_b$ | |
| Mean | 1.02 | 1.12 | 1.08 | 1.11 | 1.17 | 1.18 | | 0.24 |

Note: Means followed with the same letters within rows or column were not significantly different based on the HSD at $p < 0.05$

Table 7. The average value of radicle length for several local upland rice cultivars resulting from the administration of various concentrations of NaCl

| Cultivars | Concentrations of NaCl | | | | | | Mean | HSD 5% |
|---|---|---|---|---|---|---|---|---|
| | 0% | 0.2% | 0.4% | 0.6% | 0.8% | 1% | | |
| Dongan | 0.23 | 0.23 | 0.22 | 0.22 | 0.22 | 0.22 | $0.22_b$ | 0.05 |
| Pulu Tau Leru | 0.19 | 0.17 | 0.16 | 0.15 | 0.13 | 0.13 | $0.16_a$ | |
| Delima | 0.24 | 0.24 | 0.21 | 0.21 | 0.18 | 0.18 | $0.21_b$ | |
| Jahara | 0.29 | 0.26 | 0.24 | 0.24 | 0.23 | 0.20 | $0.24_{bc}$ | |
| Kalendeng | 0.29 | 0.27 | 0.27 | 0.25 | 0.22 | 0.22 | $0.25_{bc}$ | |
| Pulu Konta | 0.37 | 0.34 | 0.33 | 0.27 | 0.25 | 0.20 | $0.29_c$ | |
| Mean | $0.27_b$ | $0.25_b$ | $0.24_{ab}$ | $0.22_{ab}$ | $0.21_{ab}$ | $0.19_a$ | | 0.05 |

Note: Means followed with the same letters within rows or column were not significantly different based on the HSD at $p < 0.05$

## DISCUSSION

The results showed that the cultivar and various concentrations of NaCl had a significant influence on the changes in growth potential observation, germination, plumula length, and radicule length. The results of the study (Mustakim et al., 2020) reported that there was an interaction between gogo rice cultivars and NaCl concentrations on germination parameters. The study results show that an increase in NaCl concentration up to 1% results in a decrease in germination and an increase in germination time. The increase in NaCl concentration indicates that the inability of somatic cells and plant tissues to adjust to the increase in NaCl concentration is due to osmotic or ionic stress (Shanthi et al., 2010). The results of the study (Halindra et al., 2019) found that the higher the NaCl solution, the growth and germination of rice seeds became stunted, and the concentration of 2000 ppm-8000 ppm is the concentration of NaCl, which has a tolerant nature to sprout growth in nine local rice seed varieties. Most plants that suffer from salt stress show a decrease in plant growth and yield. Growth and yield of cultivated plants generally decrease in soil EC of 4 dS/m or more; even sensitive plants can be affected by EC 3 dS/m (Karolinoerita & Yusuf, 2020). The results of (Rajakumar, 2013) research shows that using NaCl from 0-300 mM has affected the percentage of rice seed germination. The use of 5 mM affects the speed of germination. Similarly, the potential grows.

Increased NaCl concentration can affect water absorption by seeds and affect seed viability; this leads to inhibition of metabolic processes, resulting in reduced germination and increased germination time. Increasing the concentration of table salt can reduce the level of viability of rice seeds, where the higher the concentration of table salt, the lower the growth potential and germination of rice seeds (Faisal, 2019). The effect of excess salt on rice plants is reduced germination speed and plant height (Hutajulu et al., 2013). Salinity in seed planting media can affect the seed germination process because it can reduce the water potential in the growing media to inhibit water absorption by germinating seeds (Rini et al., 2005). Salinity stress affects food reserves and proteins that function in germination. Food reserves from seeds are obtained from assimilate obtained from the process of photosynthesis during cultivation in the field (Muttaqien et al., 2019).

The results showed that each cultivar has a different tolerance level to salinity stress, and the adaptability of each cultivar influences the difference. Dongan, Pomegranate, Jahara, and Kalendeng cultivars resist salinity stress up to 1% NaCl concentration because they produce germination ≥ 80%. This is because all four cultivars have better genetics than other cultivars. Genetic factors strongly support the level of viability and vigour of a seed; seeds that have superior genetics have a high level of viability and vigour, and vice versa. Seeds that grow well to higher concentrations indicate better genetic makeup because seeds with good genetics will provide the best germination even though the growing environment changes, in this case, giving NaCl concentrations up to 1%.

Salinity stress makes water less available to plants, which reduces metabolic processes in the plant body, including photosynthesis. This leads to a lower rate of photosynthesis, resulting in reduced photosynthate production and, consequently, a decrease in the dry weight of plants due to salinity stress. This decrease in dry weight will vary from cultivar to cultivar. Rice cultivars that are sensitive to stress will have a greater decrease in dry weight than salinity-tolerant rice cultivars (Jasmi, 2016). The research results by (Desheva et al., 2022) show that NaCl solution of 75-150 mM has not influenced the germination of rice plants.

## CONCLUSION

The results showed that there was no interaction with all germination variables; cultivars and concentrations had a significant effect on maximum growth potential, germination, germination time, plumula length, radicle length and dry weight of sprouts, while cultivars affected the wet weight of sprouts. Kalendeng has a high tolerance to salinity. NaCl concentration up to 0.6% has reduced the germination of local upland rice.

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