Package 'SeedCalc'

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Title Seed Germination and Seedling Growth Indexes

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Description Functions to calculate seed germination and seedling emergence and growth indexes. The main indexes for germination and seedling emergence, considering the time for seed germinate are: T10, T50 and T90, in Farooq et al. (2005) <10.1111/j.1744-7909.2005.00031.x>; and MGT, in Labouriau (1983). Considering the germination speed are: Germination Speed Index, in Maguire (1962), Mean Germination Rate, in Labouriau (1983); considering the homogeneity of germination are: Coefficient of Variation of the Germination Time, in Carvalho et al. (2005) <10.1590/S0100-84042005000300018>, and Variance of Germination, in Labouriau (1983); Uncertainty, in Labouriau and Valadares (1976) <ISSN:0001-3765>; and Synchrony, in Primack (1980). The main seedling indexes are Growth, in Sako (2001), Uniformity, in Sako (2001) and Castan et al. (2018) <doi:10.1590/1678-992x-2016-0401>; and Vigour, in Medeiros and Pereira (2018) <doi:10.1590/1983-40632018v4852340>.

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`SeedCalc-package` *Seed germination and seedling growth indexes*

Description

Functions to calculate seed germination and seedling emergence and growth indexes.

The main indexes for germination and seedling emergence, considering the time for seed germinate are: T10, T50 (Farooq et al., 2005), T90 e MGT (Labouriau, 1983); considering the germination speed are: Germination Speed Index (Maguire, 1962), Mean Germination Rate (Labouriau, 1983); considering the homogeneity of germination are: Coefficient of Variation of the Germination Time (Carvalho et al., 2005) and Variance of Germination (Labouriau, 1983); Uncertainty (Labouriau & Valadares, 1976) and Synchrony (Primack, 1980).

The main seedling indexes are Growth, Uniformity and Vigour (Sako, 2001; Medeiros & Pereira, 2018).

Details

Package:	SeedCalc
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Author(s)

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References

CARVALHO, M. P., SANTANA, D. G., RANAL, M. A. (2005) <doi:10.1590/S0100-84042005000300018>

FAROOQ, M., BASRA, S. M. A., AHMAD, N., HAFEEZ, K. (2005) <doi:10.1111/j.1744-7909.2005.00031.x>

LABOURIAU L. G., VALADARES, M.B. (1976, ISSN:0001-3765)

LABOURIAU, L. G. (1983) Uma nova linha de pesquisa na fisiologia da germinação das sementes. Anais do XXXIV Congresso Nacional de Botânica. SBB, Porto Alegre, 11–50.

MAGUIRE, J. D. (1962) <doi:10.2135/cropsci1962.0011183X000200020033x>

MEDEIROS, A. D. DE, PEREIRA, M. D. (2018) <doi:10.1590/1983-40632018v4852340>

PRIMACK, R.B. (1980) <doi:10.2307/2259460>

SAKO, Y., MCDONALD, M. B., FUJIMURA, K., EVANS, A. F., BENNETT, M. A. A system for automated seed vigour assessment. Seed Science and Technology, v. 29, n. 3, p. 625–636, 2001.

CVG *Velocity of Germination Coefficient*

Description

Calculates the Velocity of Germination Coefficient (Nichols & Heydecker, 1968).

Usage

```
CVG(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

NICHOLS, M. A.; HEYDECKER, W. Two approaches to the study of germination data. Proceedings of the International Seed Testing Association, v. 33, p. 531–540, 1968.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
CVG(time,nger)
```

CVt *Germination Time Coefficient of variation*

Description

Calculates the Germination Time Coefficient of variation (Carvalho et al., 2005).

Usage

```
CVt(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

CARVALHO, M. P.; SANTANA, D. G.; RANAL, M. A. Emergência de plântulas de Anacardium humile A. St.-Hil. (Anacardiaceae) avaliada por meio de amostras pequenas. Revista Brasileira de Botânica, v. 28, n. 3, p. 627–633, 2005.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
CVt(time,nger)
```

FGP *Final Percentage of Germination*

Description

Calulated the Final Percentage of Germination.

Usage

```
FGP(nger, Nseeds)
```

Arguments

nger	It is a Vector object containg the accumulated number of seeds geminated.
Nseeds	The total amount of seeds used for the germination or emergence test.

Examples

```
nger <- c(0,2,4,15,25,38,45,50,50,50)
FGP(nger,50)
```

GermCalc *GermCalc Function*

Description

Calculates all indices for seed germination or seedling emergence.

Usage

```
GermCalc(germdata, NSeeds)
```

Arguments

germdata	A data.frame object. The first column is the time for germination, and the others are the total number of seeds germinated until each time
NSeeds	The total amount of seeds used for the germination or emergence test.

Author(s)

Laercio Junio da Silva <laerciojdsilva@gmail.com.br> Andre Dantas de Medeiros <medeiros.seeds@gmail.com > Ariadne Morbeck Santos Oliveira <ariadneoliveira86@gmail.com>

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
rep1 <- c(0,2,4,15,25,38,45,50,50,50)
rep2 <- c(0,4,6,18,22,39,40,48,50,50)
germdata <- data.frame(time,rep1,rep2)
GermCalc(germdata, 50)
```

---

growth *Seedling Growth Index*

Description

It calculates the Seedling Growth Index (Sako, 2001).

Usage

```
growth(lengths, wr = 90, wh = 10)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root length.
wr	A numeric value between zero and 100. Default is 90. Is the weight given to the root lenght in the Growth index calculation.
wh	A numeric value between zero and 100. Default is 10. Is the weight given to the shoot lenght in the Growth index calculation.

References

SAKO, Y.; MCDONALD, M. B.; FUJIMURA, K.; EVANS, A. F.; BENNETT, M. A. A system for automated seed vigour assessment. Seed Science and Technology, v. 29, n. 3, p. 625-636, 2001.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
Unif <- growth(Seedling, wr = 90, wh = 10)
Unif
```

GSI *Germination Speed Index*

Description

Calculates the Germination Speed Index (Maguire, 1982).

Usage

```
GSI(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

MAGUIRE, J. D. Speed of germination-aid selection and evaluation for seedling emergence and vigor. Crop Science, v. 2, p. 176–177, 1962.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
GSI(time,nger)
```

---

mean_pa *Shoot Length*

Description

It calculates the Mean Shoot Length

Usage

```
mean_pa(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root length.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
SL <- mean_pa(Seedling)
SL
```

---

mean_raiz *Root Length*

Description

It calculates the Mean Root Length

Usage

```
mean_raiz(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root length.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
RL <- mean_raiz(Seedling)
RL
```

---

mean_razao *Ratio Root-Shoot Length*

Description

It calculates the Mean Ration Root-Shoot Length

Usage

```
mean_razao(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root length.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
RSL <- mean_razao(Seedling)
RSL
```

mean_total *Seedling Length*

Description

It calculates the Mean Seedling Length

Usage

```
mean_total(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root length.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)

print(Seedling)
SLen <- mean_total(Seedling)
SLen
```

MGR *Mean Germination Rate*

Description

Calculates the Mean Germination Rate (Labouriau, 1983). It is 1/MGT.

Usage

```
MGR(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

LABOURIAU, L. G. (1983). Uma nova linha de pesquisa na fisiologia da germina??o das sementes. Anais do XXXIV Congresso Nacional de Botanica. SBB, Porto Alegre, 11-50.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
MGR(time,nger)
```

MGT *Mean Germination Time*

Description

Calculates the Mean Germination Time (Labouriau, 1983).

Usage

```
MGT(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

LABOURIAU, L. G. (1983). Uma nova linha de pesquisa na fisiologia da germina??o das sementes. Anais do XXXIV Congresso Nacional de Botanica. SBB, Porto Alegre, 11-50.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
MGT(time,nger)
```

PlantCalc *PlantCalc Function*

Description

Calculates all indices for seedlings.

Usage

```
PlantCalc(lengths, Ger=100, wr = 90, wh = 10, wg = 0.7, wu = 0.3, Unif = 1)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root lenght.
Ger	A data.frame object containing two columns. The first must contain the identification of the treatments identical to the first column of the seedling lenght data. These values is used for vigor_corr calculation. The default is the numeric value 100 and in this case the vigor_corr is equal to vigor index.
wr	A numeric value between zero and 100. Default is 90. Is the weight given to the root lenght in the Growth index calculation.
wh	A numeric value between zero and 100. Default is 10. Is the weight given to the shoot lenght in the Growth index calculation.
wg	A numeric value between zero and one. Default is 0.7. Is the weight given to the seedling lenght in the Vigor index calculation.
wu	A numeric value between zero and one. Default is 0.3. Is the weight given to the Unif_2 index calculation.
Unif	A numeric value, 1 or 2. If 1, the unif_1 index is used for Vigor index calculation. If 2, the Unif_2 index is used for Vigor index calculation.

Author(s)

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Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
SeedlIndexes <- PlantCalc(Seedling)
```

```
SeedlIndexes

Ger <- data.frame(LOTE = c(1,2), GER = (c(90,80)))
print(Ger)

SeedlIndexes <- PlantCalc(Seedling, Ger)
SeedlIndexes
```

Sinc *Germination Synchrony*

Description

Calculates the germination synchrony (Primack, 1980).

Usage

```
Sinc(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

PRIMACK, R.B. 1980. Variation in the phenology of natural populations of montane shrubs in New Zealand. Journal of Ecology, v.68, p.849-862.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
Sinc(time,nger)
```

T10 *Time spent to 10 percent germination*

Description

Calculates the time spent to 10 percent germination (Adapted from Farooq et al., 2005).

Usage

```
T10(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

FAROOQ, M.; BASRA, S. M. A.; AHMAD, N.; HAFEEZ, K. Thermal Hardening: A New Seed Vigor Enhancement Tool in Rice. Journal of Integrative Plant Biology, v. 47, n. 2, p. 187-193, 2005.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
T10(time,nger)
```

T50 *Time spent to 50 percent germination*

Description

Calculates the time spent to 50 percent germination (Farooq et al., 2005).

Usage

```
T50(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

FAROOQ, M.; BASRA, S. M. A.; AHMAD, N.; HAFEEZ, K. Thermal Hardening: A New Seed Vigor Enhancement Tool in Rice. Journal of Integrative Plant Biology, v. 47, n. 2, p. 187-193, 2005.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
T50(time,nger)
```

T90 *Time spent to 90 percent germination*

Description

Calculates the time spent to 90 percent germination (Adapted from Farooq et al., 2005).

Usage

```
T90(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

FAROOQ, M.; BASRA, S. M. A.; AHMAD, N.; HAFEEZ, K. Thermal Hardening: A New Seed Vigor Enhancement Tool in Rice. Journal of Integrative Plant Biology, v. 47, n. 2, p. 187-193, 2005.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
T90(time,nger)
```

Unc *Germination Uncertainty*

Description

Calculates the germination Uncertainty (Labouriau & Valadares, 1976).

Usage

```
Unc(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

LABOURIAU LG; VALADARES MB. 1976. On the germination of seeds of Calotropis procera. Anais da Academia Brasileira de Ciencias 48:174-186. LIFCHITZ A. 1981. Plantas medicinales. 5. ed. Buenos Aires: Kier. 139p.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
Unc(time,nger)
```

`UnifG` *Germination Uniformity Index*

Description

Calculates the Germination Uniformity Index (Sako, 2001).

Usage

```
UnifG(time,nger)
```

Arguments

`time`	A `vector` object containing the time for germination.
`nger`	A `vector` object containing the accumulated number of seeds germinated at each time.

References

SAKO, Y.; MCDONALD, M. B.; FUJIMURA, K.; EVANS, A. F.; BENNETT, M. A. A system for automated seed vigour assessment. Seed Science and Technology, v. 29, n. 3, p. 625-636, 2001.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
UnifG(time,nger)
```

unif_1 *Seedling Uniformity Index*

Description

It calculates the Seedling Uniformity Index (Sako, 2001).

Usage

```
unif_1(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root lenght.

References

SAKO, Y.; MCDONALD, M. B.; FUJIMURA, K.; EVANS, A. F.; BENNETT, M. A. A system for automated seed vigour assessment. Seed Science and Technology, v. 29, n. 3, p. 625-636, 2001.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
Unif <- unif_1(Seedling)
Unif
```

unif_2 *Seedling Uniformity Index*

Description

It calculates the Seedling Uniformity Index (Christiansen, 1942; adapted for Castan et al., 2018).

Usage

```
unif_2(lengths)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root lenght.

References

CASTAN, D. O. C.; GOMES-JUNIOR, F. G.; MARCOS-FILHO, J. Vigor-S, a new system for evaluating the physiological potential of maize seeds. Scientia Agricola, v. 75, n. 2, p. 167-172, 2018.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
Unif <- unif_2(Seedling)
Unif
```

VarGer *Variance of Germination Time*

Description

Calculates the Variance of Germination Time (Labouriau, 1983).

Usage

```
VarGer(time,nger)
```

Arguments

time	A vector object containing the time for germination.
nger	A vector object containing the accumulated number of seeds germinated at each time.

References

LABOURIAU, L. G. (1983). Uma nova linha de pesquisa na fisiologia da germinacao das sementes. Anais do XXXIV Congresso Nacional de Botanica. SBB, Porto Alegre, 11-50.

Examples

```
time <- c(1,2,3,4,5,6,7,8,9,10)
nger <- c(0,2,4,15,25,38,45,50,50,50)
VarGer(time,nger)
```

---

vigor *Seed Vigor Index*

Description

It calculates the Seed Vigor Index (Sako, 2001).

Usage

```
vigor(lengths, wg = 0.7, wu = 0.3, Unif = 1)
```

Arguments

lengths	A data.frame object containing seedling lengths data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot length and the fourth is the root lenght.
wg	A numeric value between zero and one. Default is 0.7. Is the weight given to the seedling lenght in the Vigor index calculation.
wu	A numeric value between zero and one. Default is 0.3. Is the weight given to the Unif_2 index calculation.
Unif	A numeric value, 1 or 2. If 1, the unif_1 index is used for vigor index calculation. If 2, the Unif_2 index is used for Vigor index calculation.

References

SAKO, Y.; MCDONALD, M. B.; FUJIMURA, K.; EVANS, A. F.; BENNETT, M. A. A system for automated seed vigour assessment. Seed Science and Technology, v. 29, n. 3, p. 625-636, 2001.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)
VigInd <- vigor(Seedling, wg = 0.7, wu = 0.3, Unif = 1)
VigInd
```

vigor_corr *Seed Corrected Vigor Index*

Description

It calculates the Seed Corrected Vigor Index (Medeiros & Pereira, 2018).

Usage

```
vigor_corr(lengths, Ger = 100, wg = 0.7, wu = 0.3, Unif = 1)
```

Arguments

lengths	A data.frame object containing seedling lenghts data with four columns. The first and second columns are for identification, e.g. treatments and repetitions. The third is the shoot lenght and the fourth is the root lenght.
Ger	A data.frame object containing two columns. The first must contain the identification of the treatments identical to the first column of the seedling length data. The default is the numeric value 100 and in this case the vigor_corr is equal to vigor index.
wg	A numeric value between zero and one. Default is 0.7. Is the weight given to the seedling lenght in the Vigor index calculation.
wu	A numeric value between zero and one. Default is 0.3. Is the weight given to the Unif_2 index calculation.
Unif	A numeric value, 1 or 2. If 1, the unif_1 index is used for vigor index calculation. If 2, the Unif_2 index is used for Vigor index calculation.

References

MEDEIROS, A. D. DE; PEREIRA, M. D. SAPL: a free software for determining the physiological potential in soybean seeds. Pesquisa Agropecuaria Tropical, v. 48, n. 3, p. 222-228, 2018.

Examples

```
Seedling <- data.frame(
LOTE = c(1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2),
REP = c(1, 1, 1, 1, 2, 2, 2, 1, 1, 1, 1, 2, 2, 2, 2),
SH = c(0.00, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 0.64, 2.77, 1.18, 1.07, 0.80, 2.65, 3.51, 1.98),
ROOT = c(4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 4.86, 6.71, 7.88, 3.68, 9.68, 8.88, 9.85, 8.75)
)
print(Seedling)

Ger <- data.frame(LOTE = c(1,2), GER = (c(90,80)))
print(Ger)

VigInd <- vigor_corr(Seedling, Ger, wg = 0.7, wu = 0.3, Unif = 1)
VigInd
```

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