

A sunset over a beach with waves and mountains in the background. The sun is low on the horizon, casting a golden glow over the water and sky. The waves are gentle and rhythmic, washing onto the sand. In the distance, a range of mountains is visible under the twilight sky.

Heliotropismo em feijão-da-praia *Sophora tomentosa* (Leguminosae)

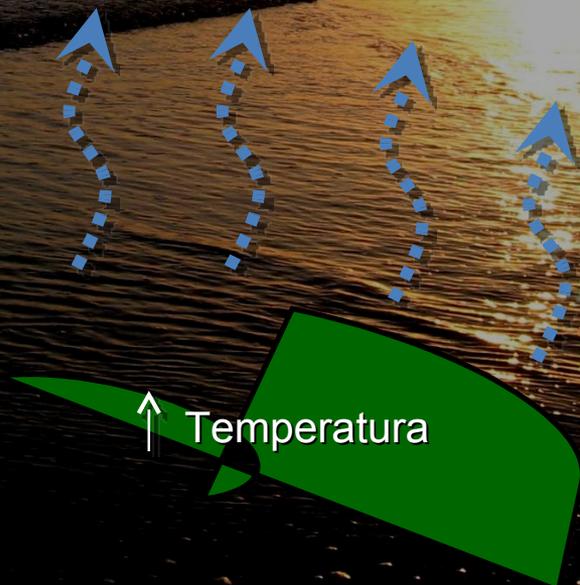
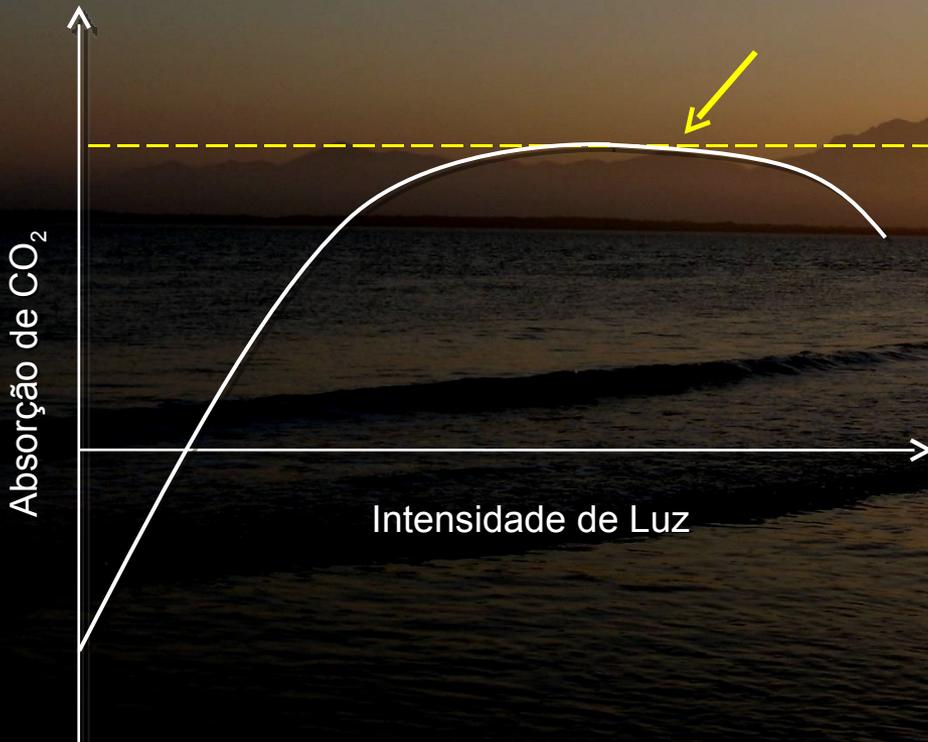
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Ecologia da Mata Atlântica

Projeto individual

25 de julho de 2008

LUZ



↑ Temperatura

L U Z - Adaptações



Pilosidade

The diagram illustrates the adaptation of leaf hair (pilosidade). On the left, a dark green leaf is shown with a large, dark green arrow pointing to its surface, indicating a high density of hairs. On the right, a light green leaf is shown with a smaller, light green arrow pointing to its surface, indicating a lower density of hairs. The background is a sunset over the ocean, with the sun low on the horizon and its light reflecting on the water.



Espessura

The diagram illustrates the adaptation of leaf thickness (espessura). On the left, a dark green leaf is shown with a large, dark green arrow pointing to its thickness, indicating a thick leaf. On the right, a light green leaf is shown with a smaller, light green arrow pointing to its thickness, indicating a thin leaf. The background is a sunset over the ocean, with the sun low on the horizon and its light reflecting on the water.



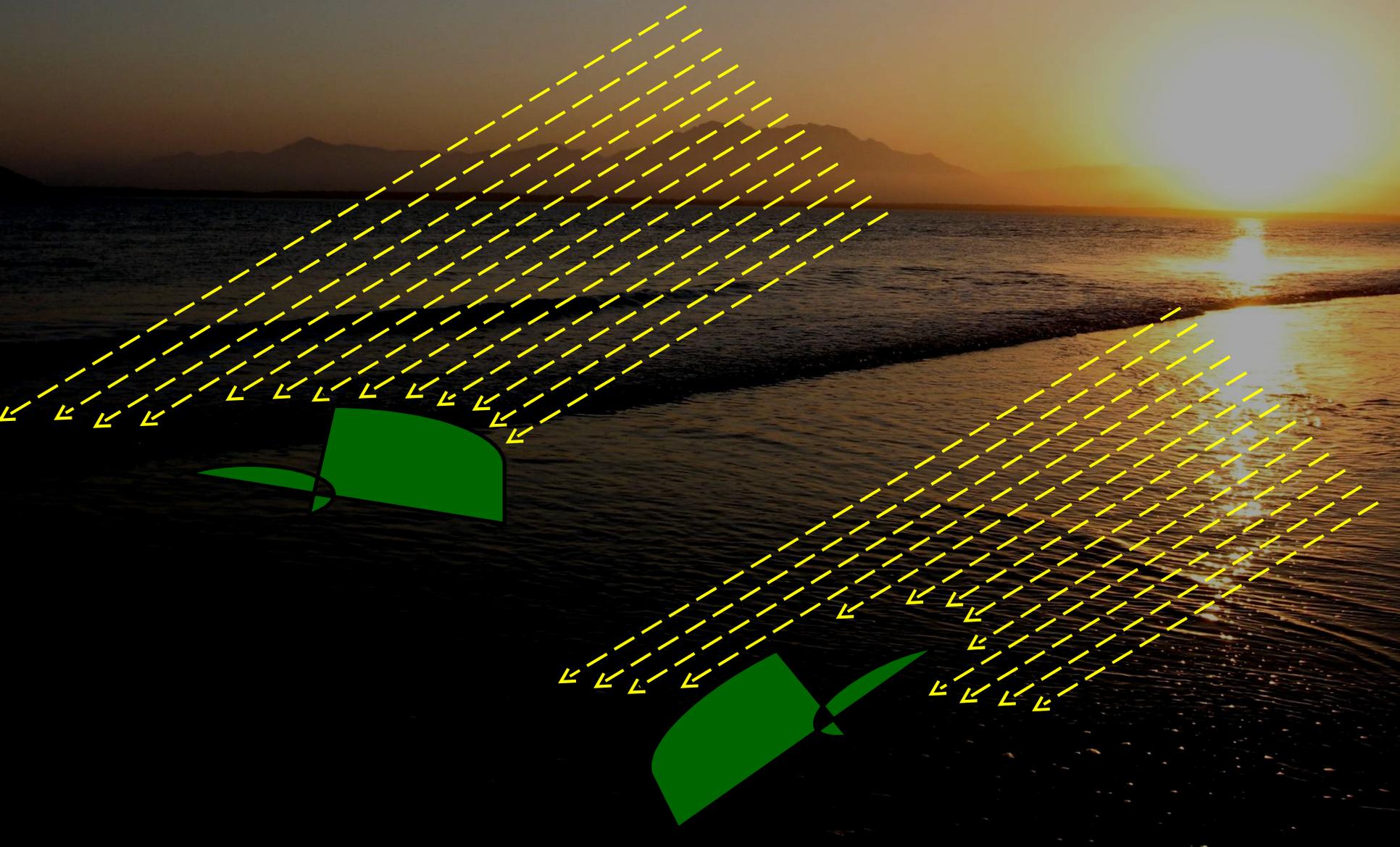
Área foliar

The diagram illustrates the adaptation of leaf area (área foliar). On the left, a dark green leaf is shown with a large, dark green arrow pointing to its surface area, indicating a large leaf area. On the right, a light green leaf is shown with a smaller, light green arrow pointing to its surface area, indicating a smaller leaf area. The background is a sunset over the ocean, with the sun low on the horizon and its light reflecting on the water.

L U Z – Heliotropismo -



L U Z – Heliotropismo -



Restinga arbustiva

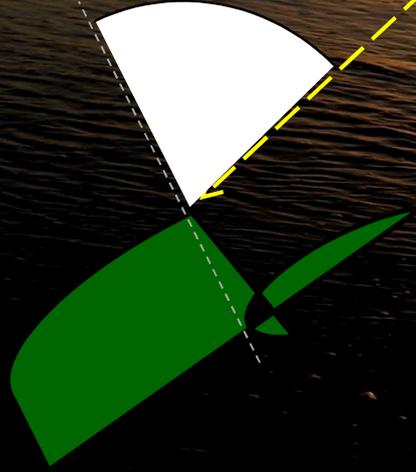
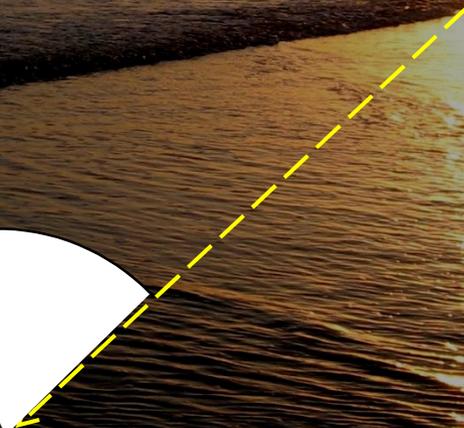
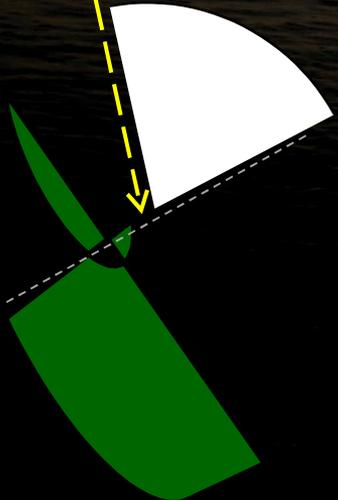
Sophora tomentosa (Leguminosae)



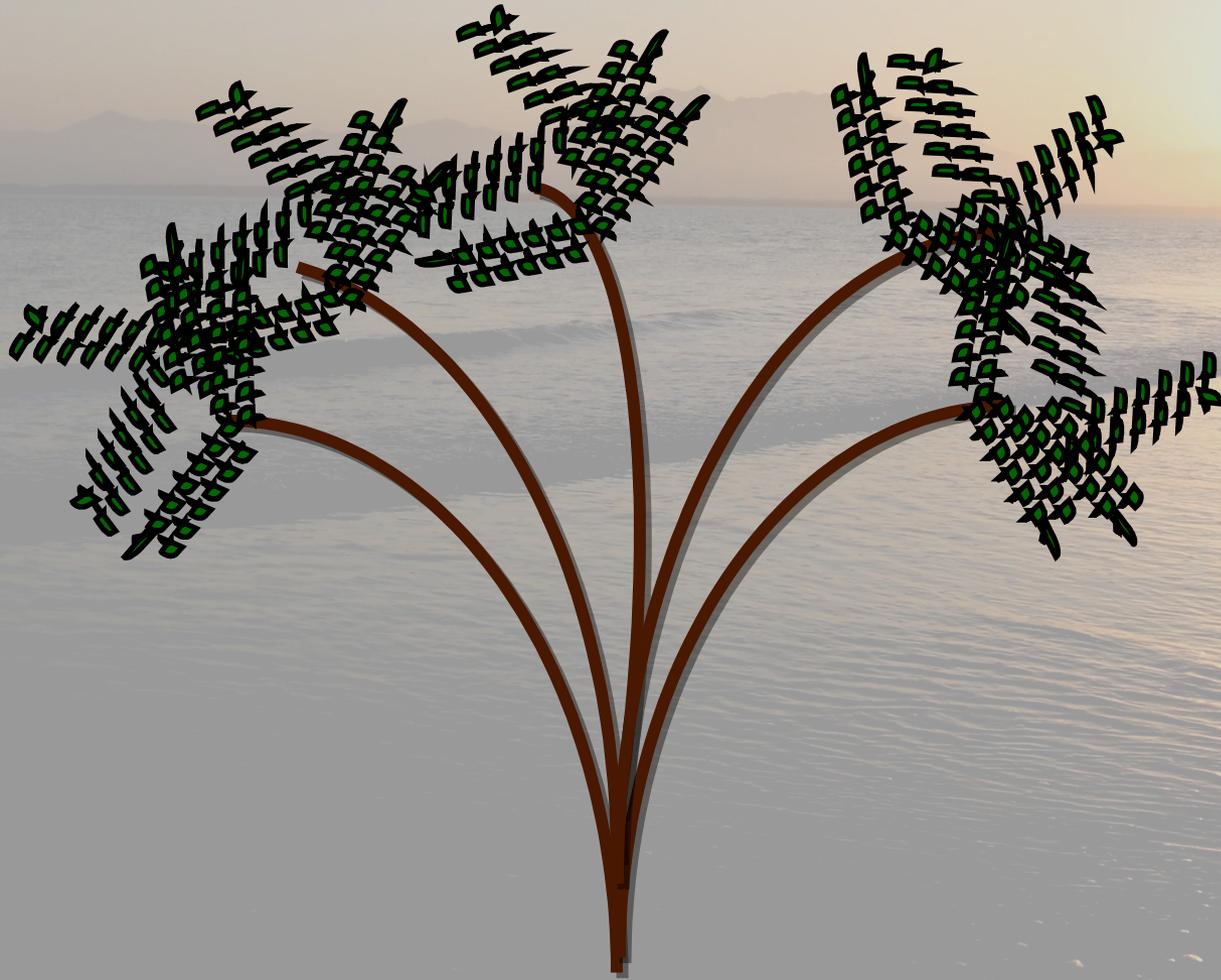
Hipótese

Sophora tomentosa altera a orientação de seus folíolos em função da direção dos raios solares → baixa intensidade de luz incidente na superfície foliar

Predição

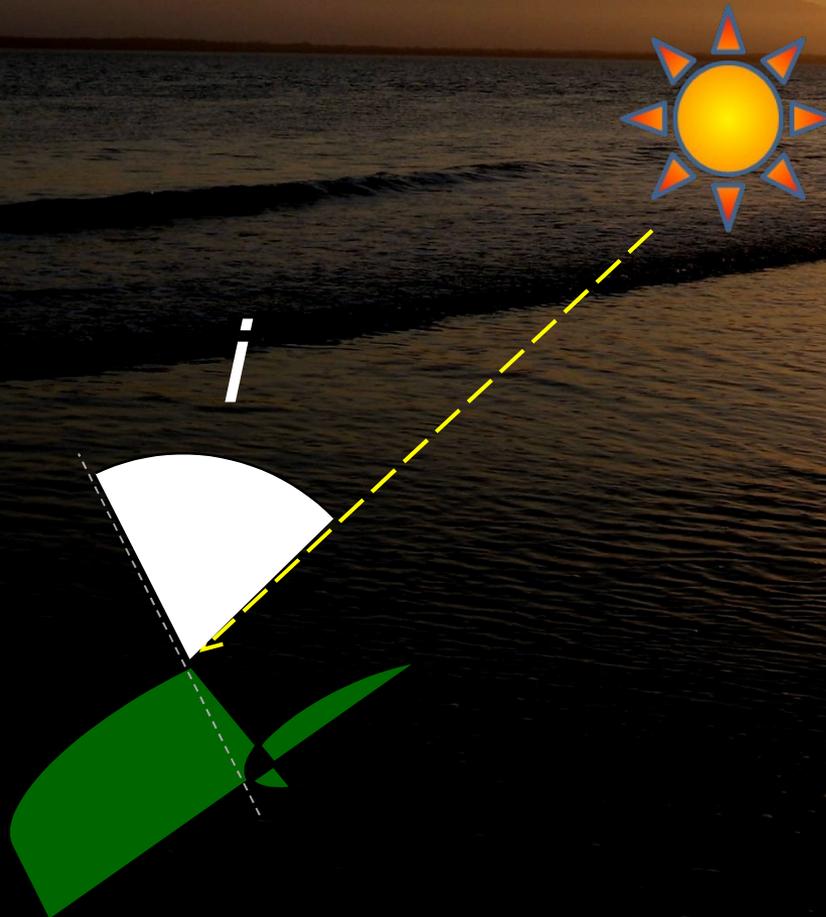


Sophora tomentosa



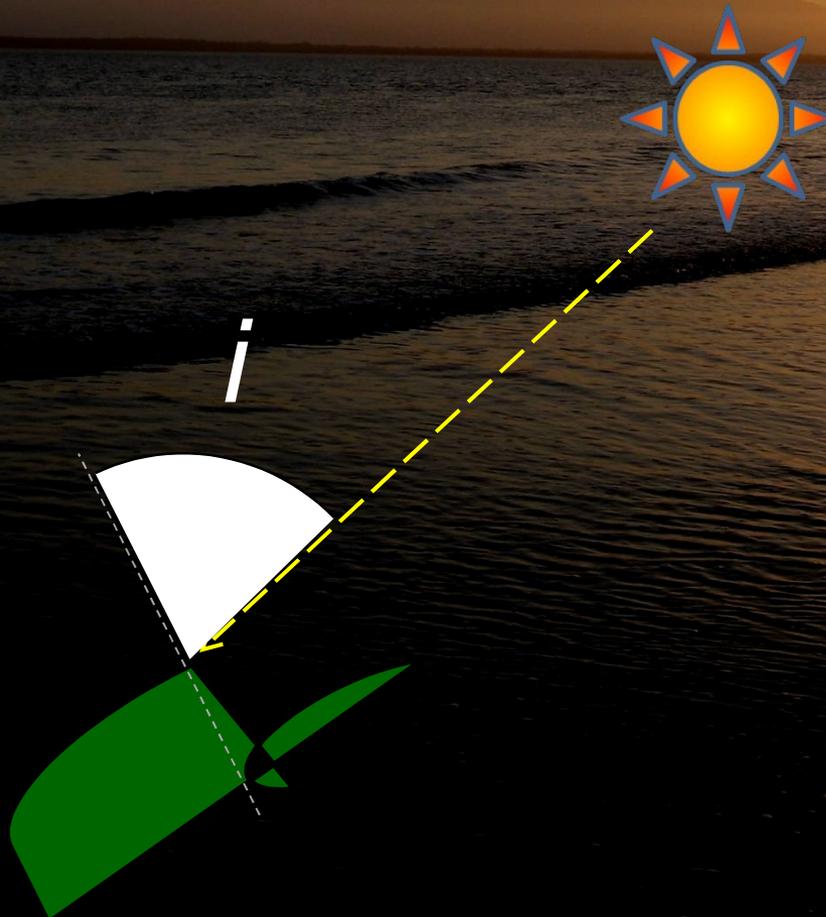
Ângulo de incidência (i)

$$\cos (i) = \cos (\alpha_F) \operatorname{sen} (\alpha_S) + \operatorname{sen} (\alpha_F) \cos (\alpha_S) \cos (\beta_S - \beta_F)$$

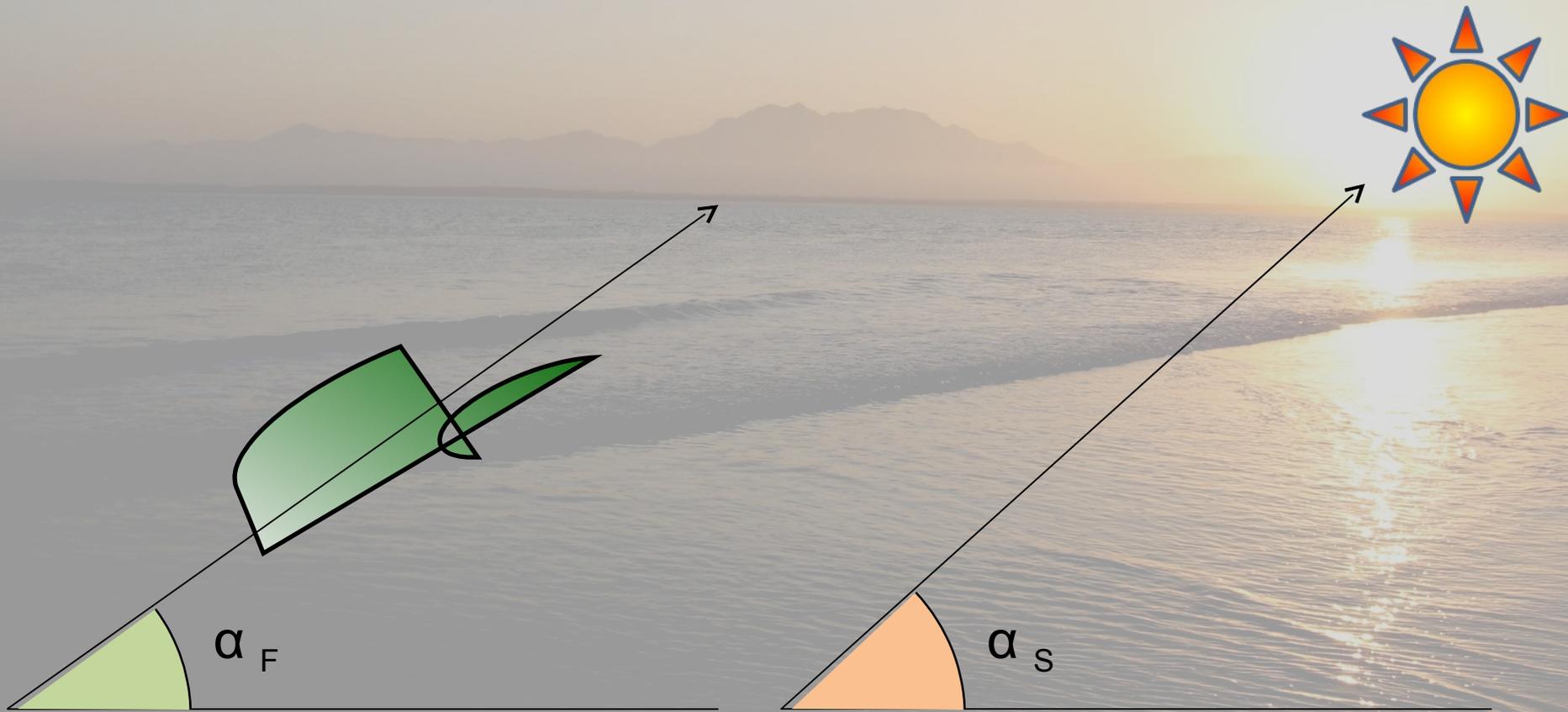


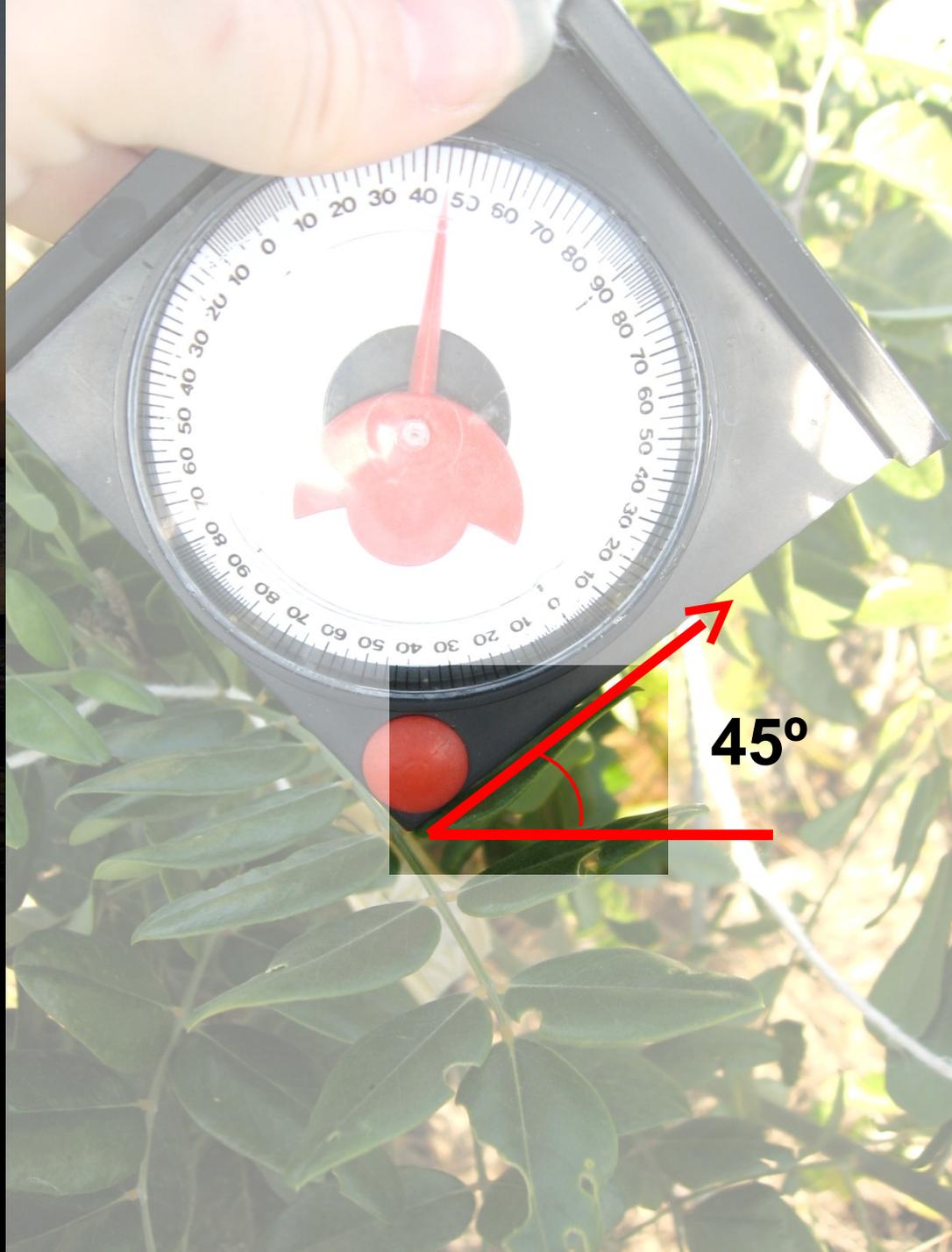
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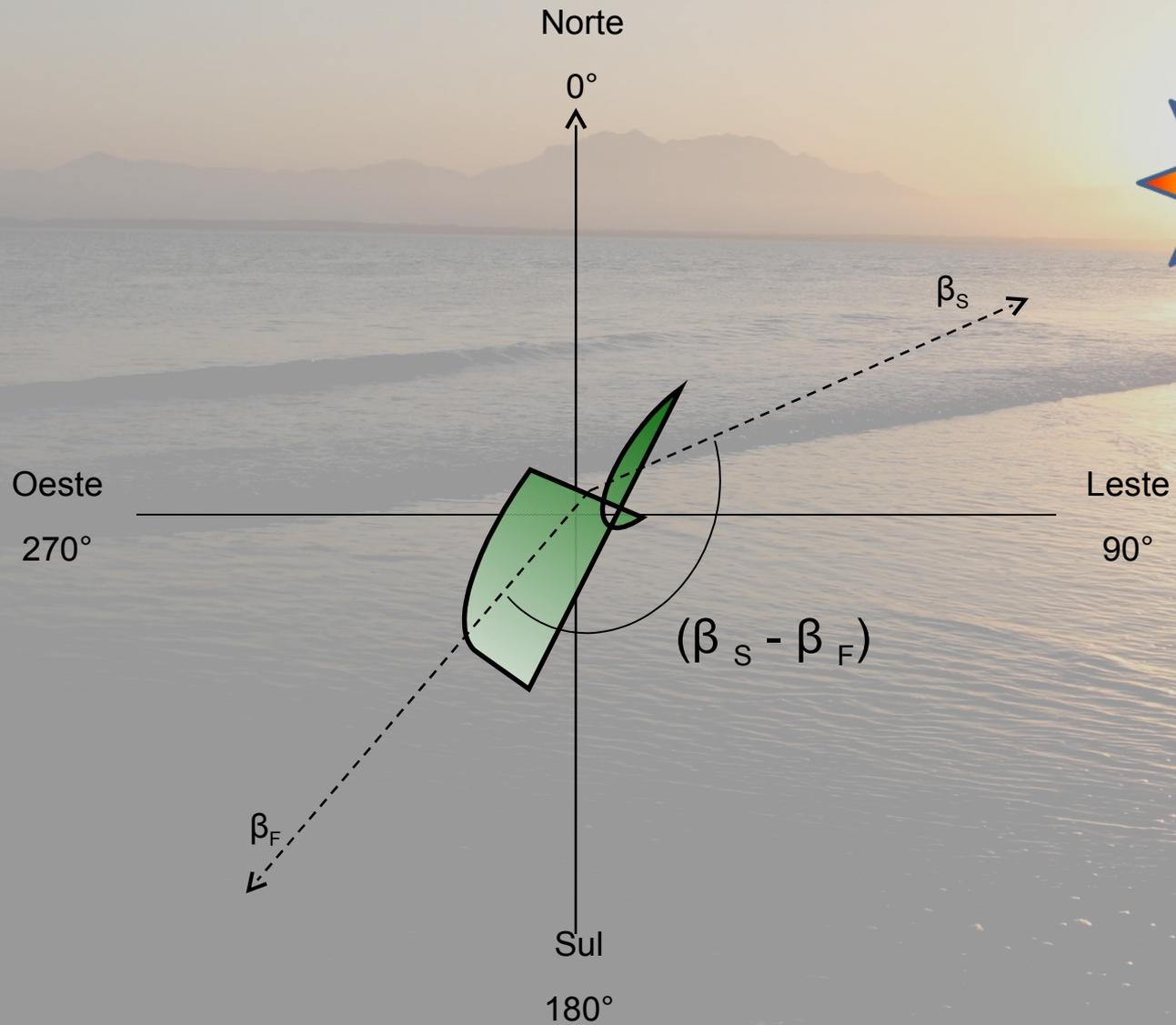


Ângulos de inclinação

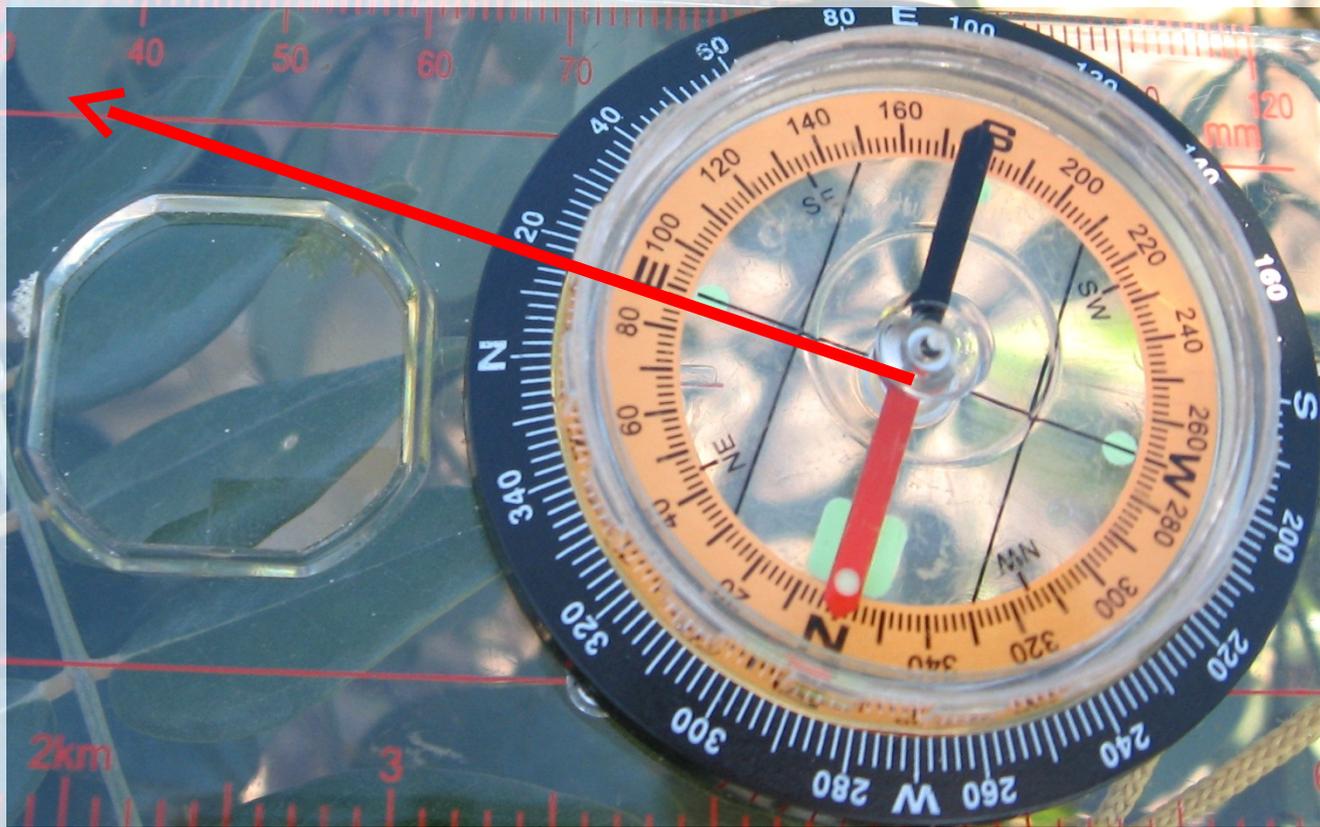




Azimuthes

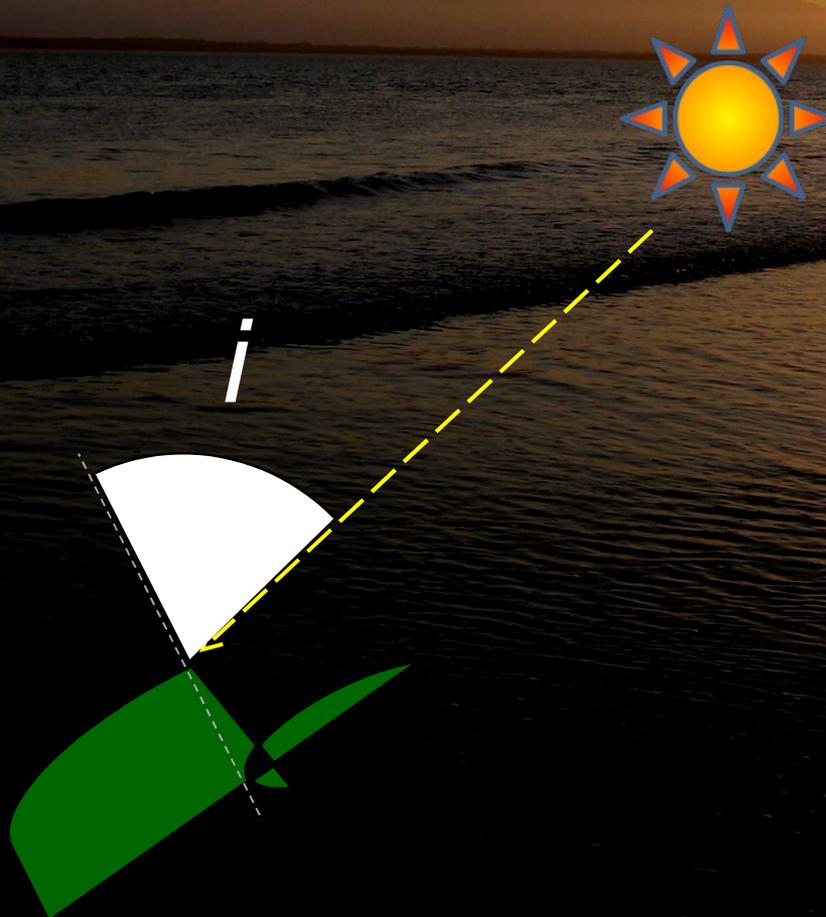


**Leste
(90°)**



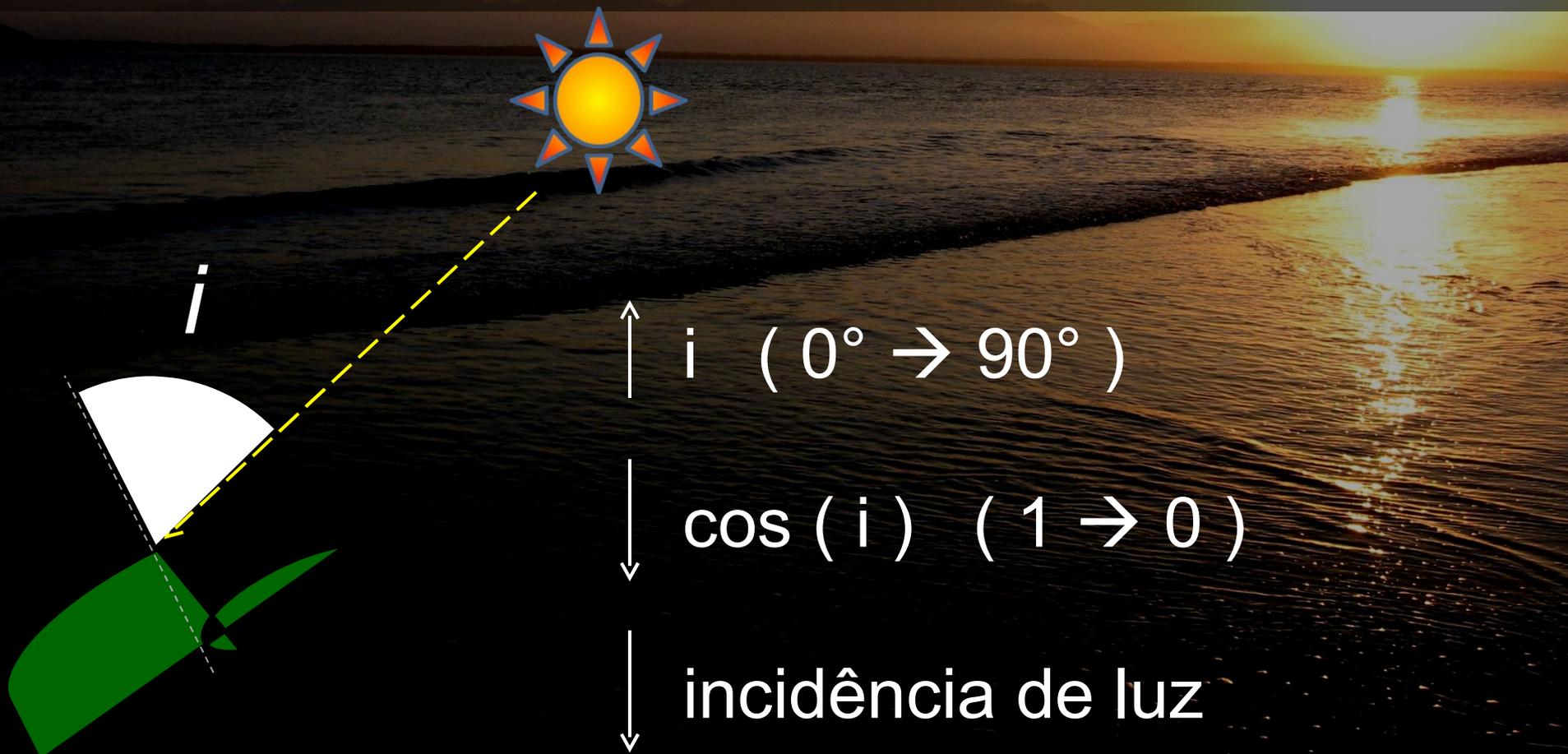
Ângulo de incidência (i)

$$\cos (i) = \cos (\alpha_F) \operatorname{sen} (\alpha_S) + \operatorname{sen} (\alpha_F) \cos (\alpha_S) \cos (\beta_S - \beta_F)$$



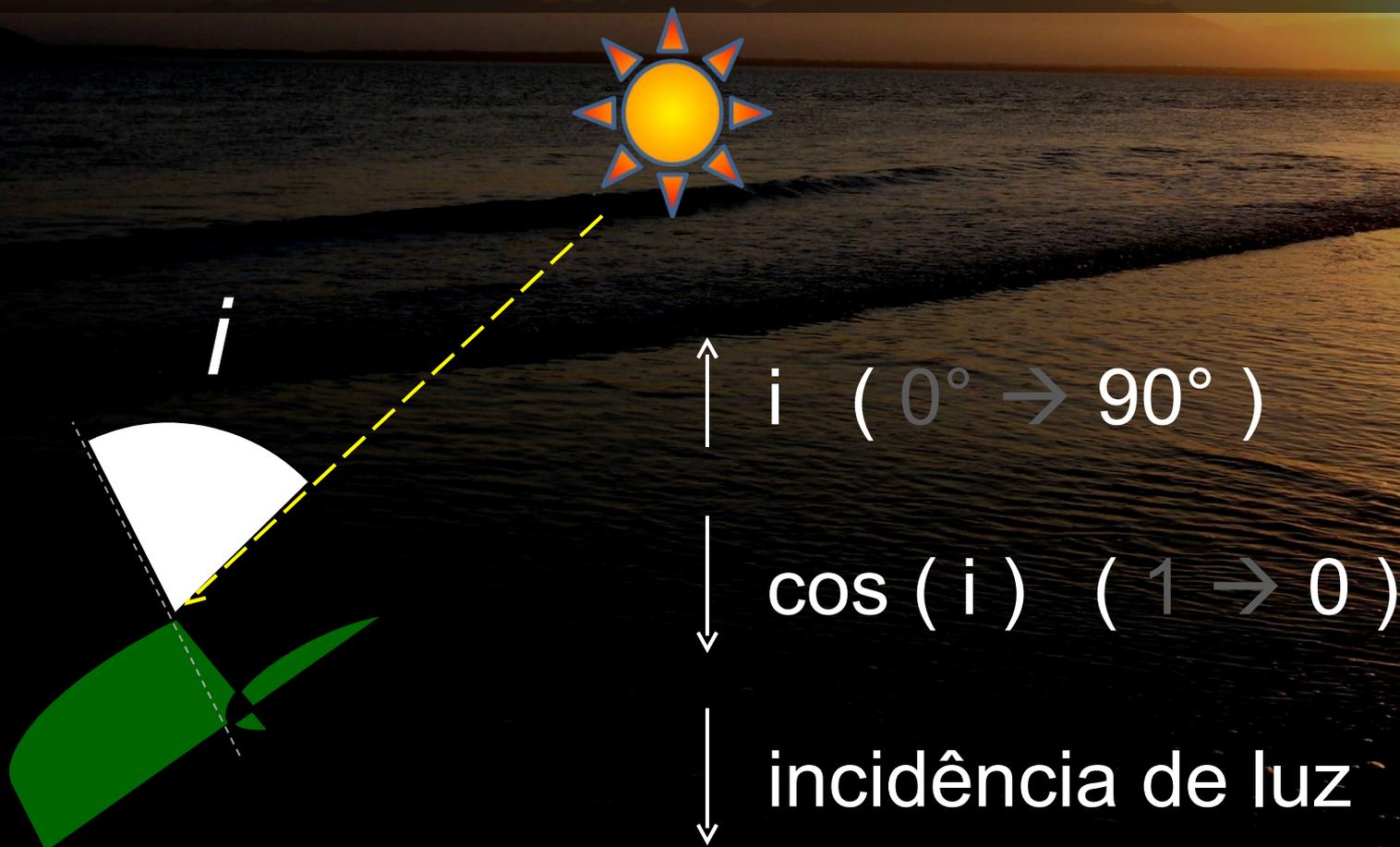
Ângulo de incidência (i)

$$\cos (i) = \cos (\alpha_F) \operatorname{sen} (\alpha_S) + \operatorname{sen} (\alpha_F) \cos (\alpha_S) \cos (\beta_S - \beta_F)$$



Ângulo de incidência (i)

$$\cos (i) = \cos (\alpha_F) \operatorname{sen} (\alpha_S) + \operatorname{sen} (\alpha_F) \cos (\alpha_S) \cos (\beta_S - \beta_F)$$



Análise – cos (i)

ANOVA (medidas repetidas) em bloco

cos (i) ~ período (M / T) + indivíduo

Análise – inclinação

Regressão linear

$$\cos(\alpha_F) \sim \cos(\alpha_S)$$



Média / indivíduo

Análise – azimutes

Teste Qui²

Uniformidade dos azimutes dos folíolos

$N = NE = L = SE = S = SO = O = NO$

Diferença entre os períodos M x T

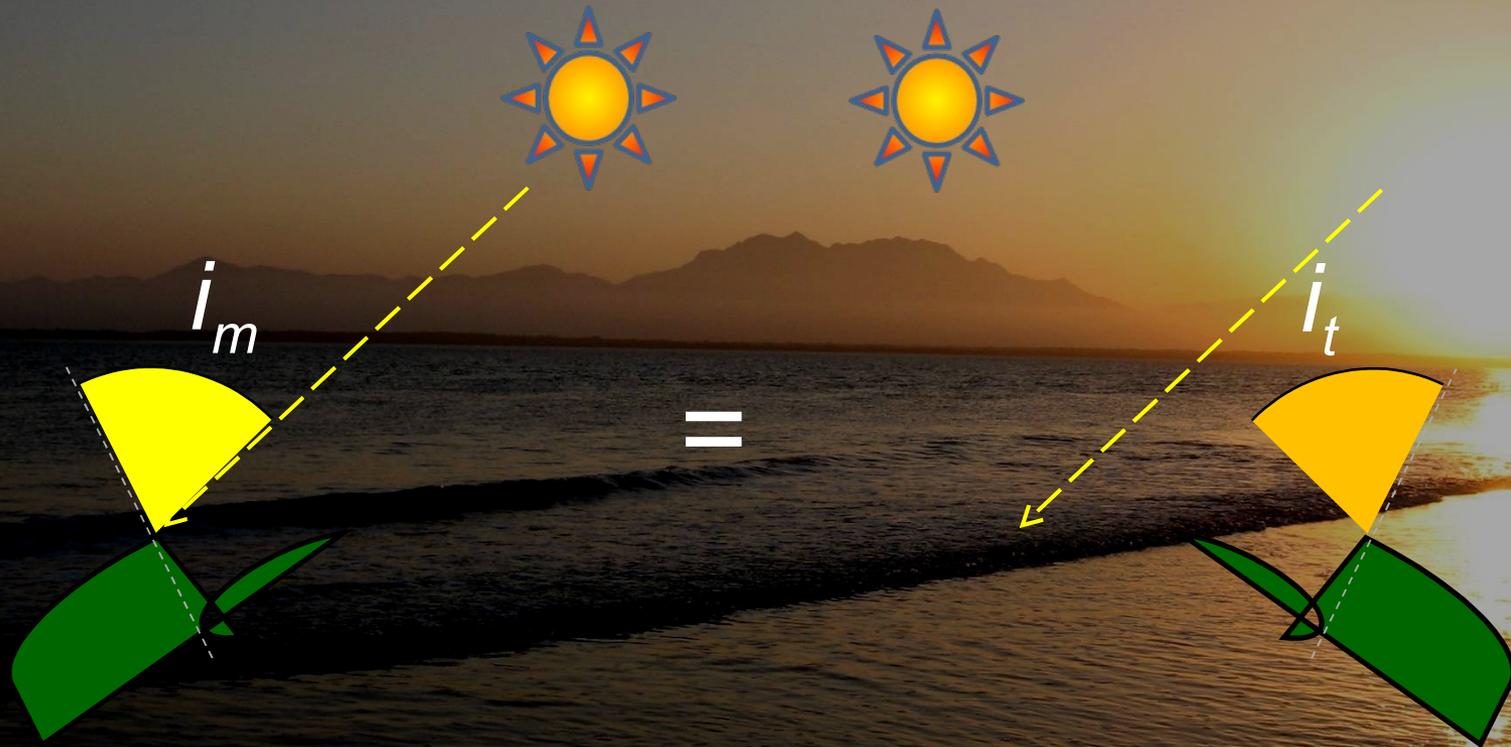
$$N_m = N_t$$

$$NE_m = NE_t$$

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Resultados – ângulo de incidência



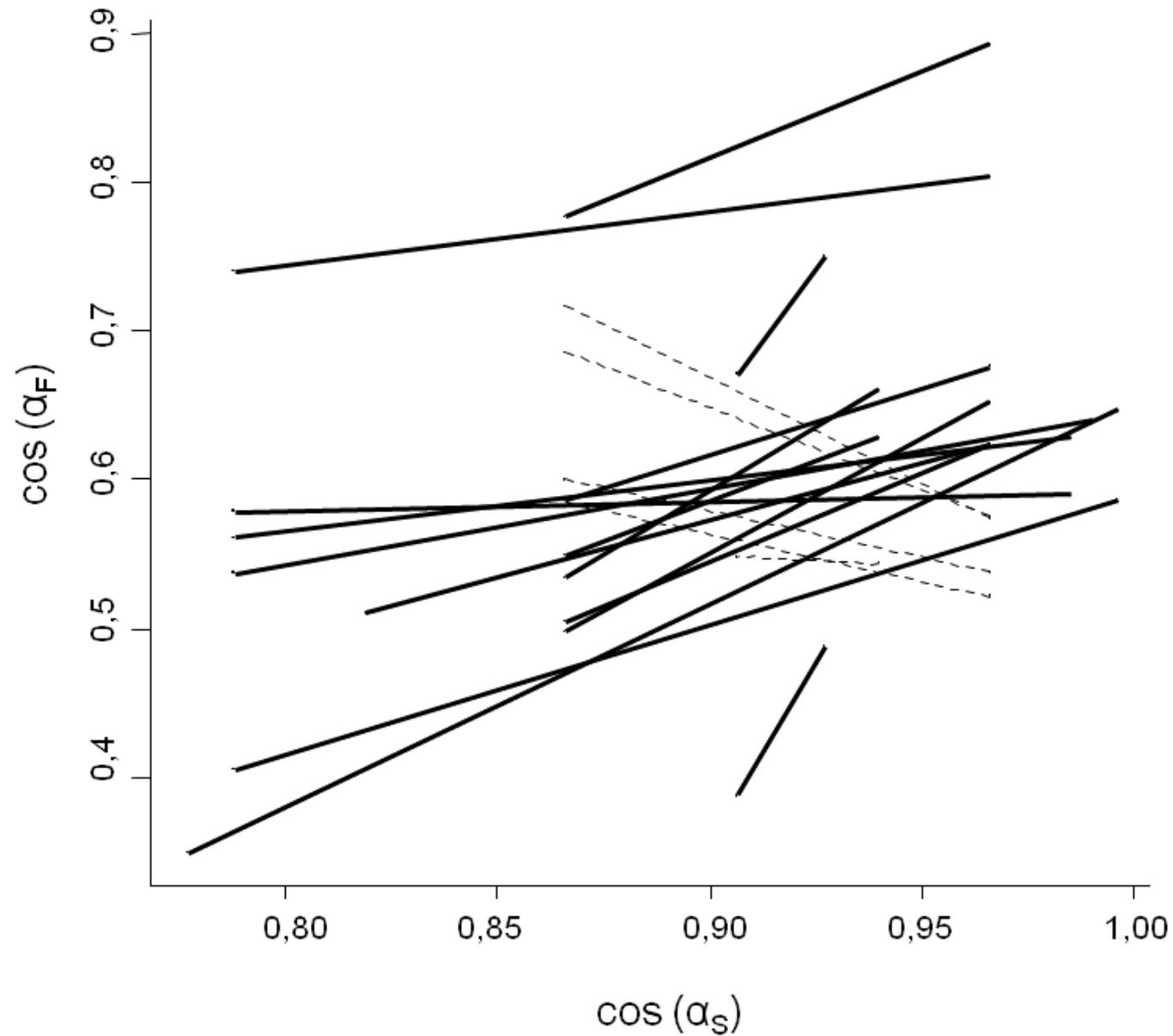
$$\cos (i) = 0,12$$

$$i = 83^{\circ}$$

ANOVA: $F_{1,359} = 0,13$; $p = 0,72$

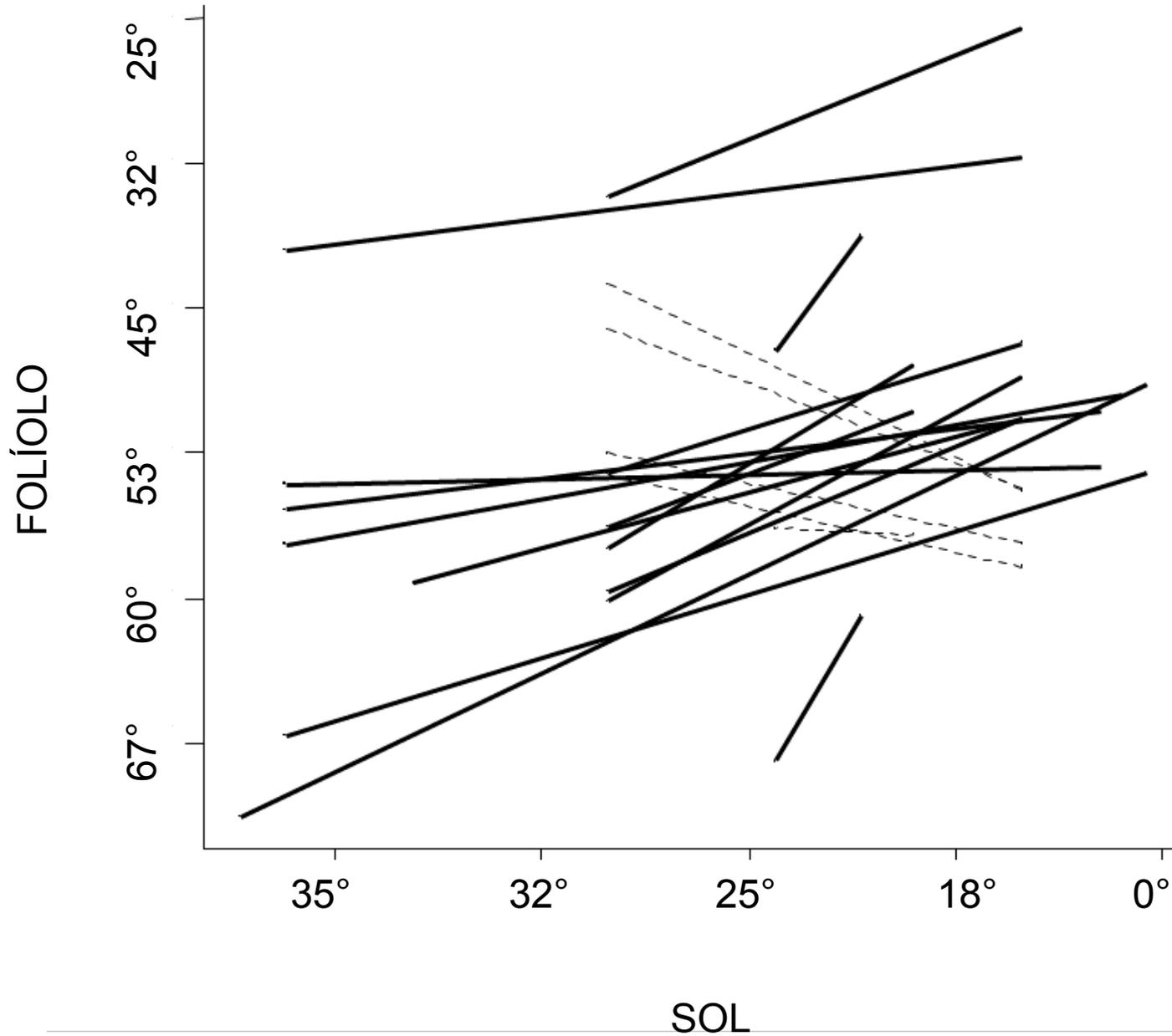
Ângulos de inclinação (α)

$F_{1,359} = 6,76; p = 0,01$



Ângulos de inclinação (α)

$F_{1,359} = 6,76; p = 0,01$

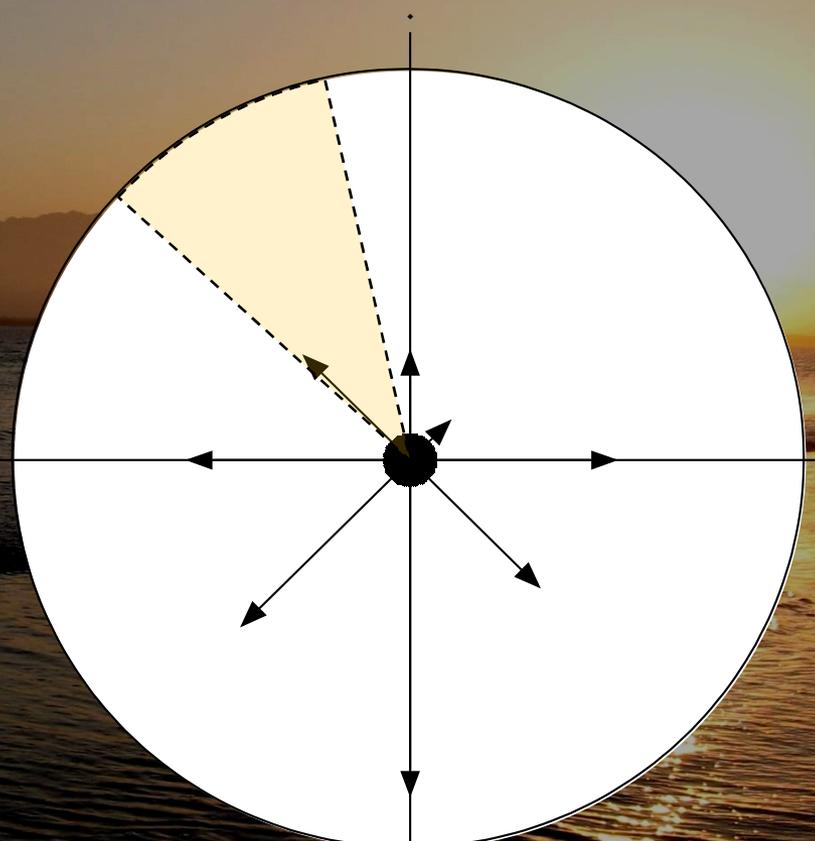
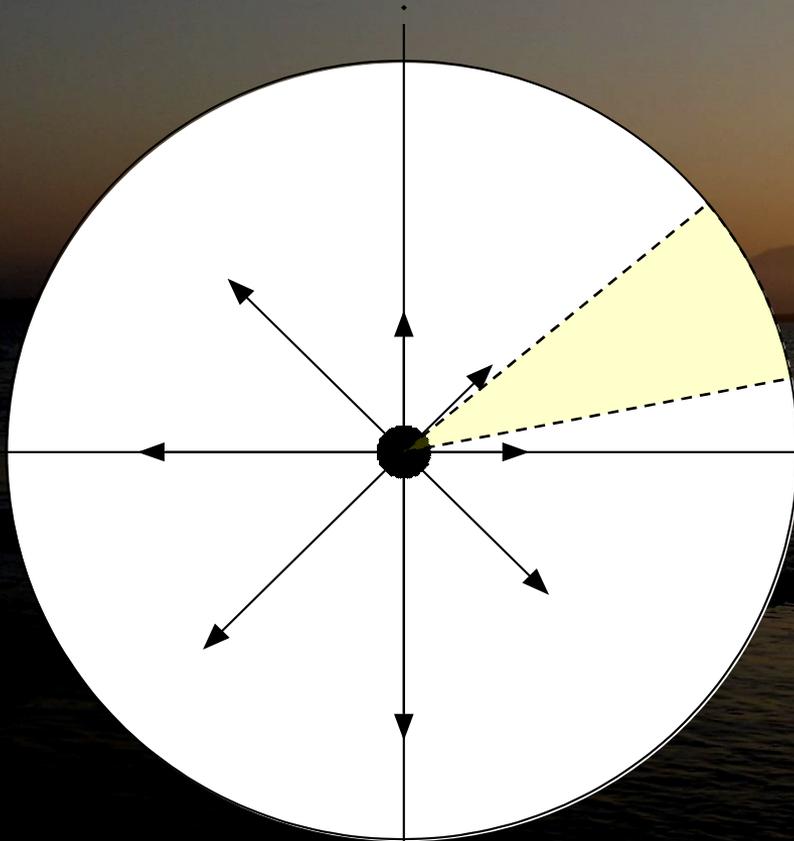


MANHÃ
manhã

Norte



TARDE
tarde



Uniformidade: $Qui^2 = 41,32$; g.l. = 7; $p < 0,001$
Manhã x Tarde: $Qui^2 = 9,63$; g.l. = 7; $p = 0,21$

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folíolos



Discussão

- Incidência do Sol nas folhas foi constante
- Inclinação – $\cos (i)$ constante
- Azimute – $\cos (i)$ baixo

Discussão

- Fototropismo negativo – favorece a ocorrência de *S. tomentosa* na restinga arbustiva
- Fatores abióticos:
 - Temperatura
 - Balanço hídrico
 - Luz