DO AGRO-ECOLOGICAL PRACTICES IMPROVE WATER PRODUCTIVITY IN IRRIGATED VEGETABLES CROPS?

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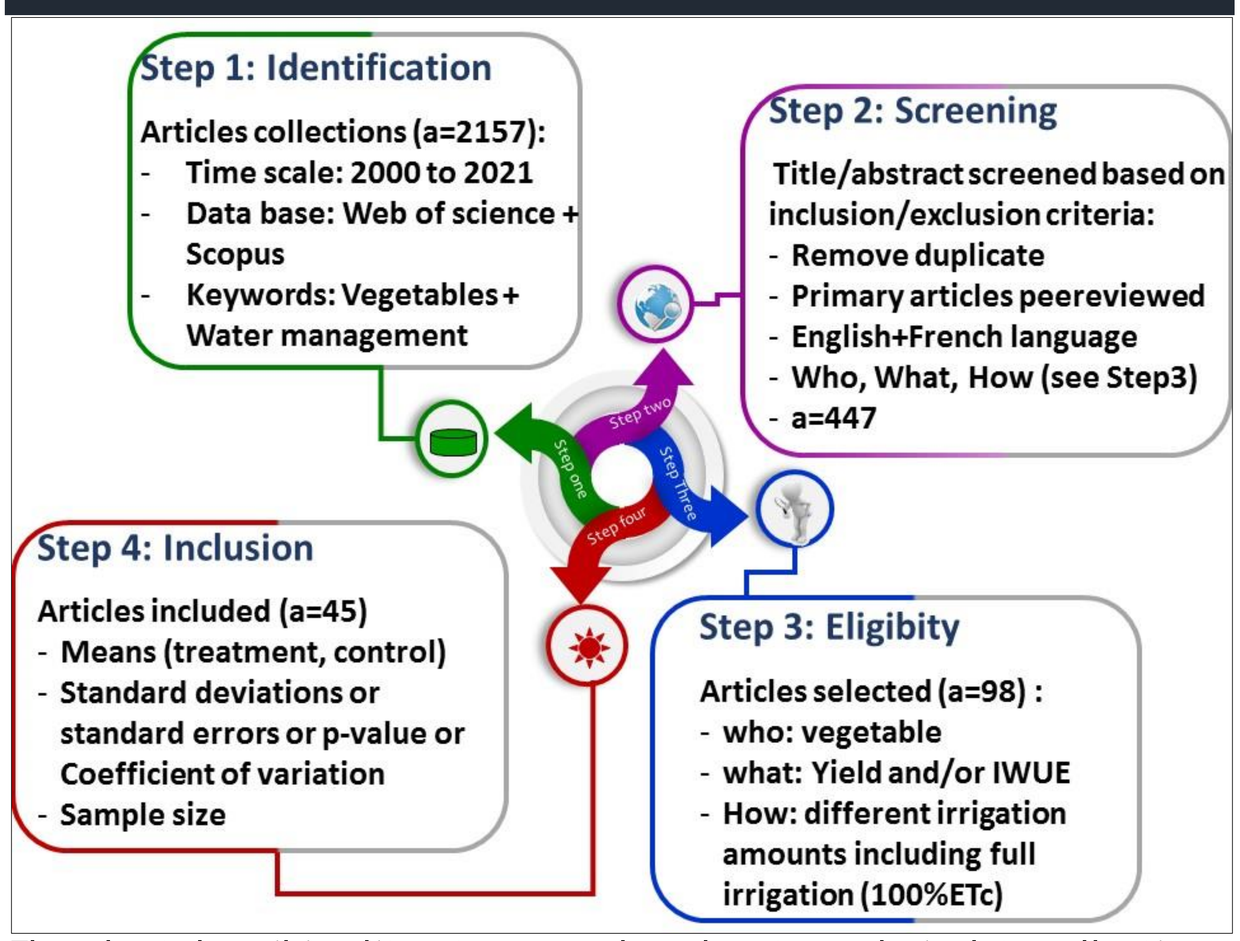
Background

Performance of irrigation systems are suggested to lead better crop yield and irrigation water use efficiency (IWUE) when combined with agroecological practices.

These practices aim at a sustainable soil, water, crop and pest management by improving soil root zone environment and increasing crop water and nutrient absorption (see 1).

It is therefore important to assess whether irrigation application methods, relative irrigation amount, season, and crop types (see 2 & 3) significantly improve crop yields and IWUE under deficit irrigation (DI) and over full irrigation (OFI) compared to full crop water requirement (100%ETc) as the control

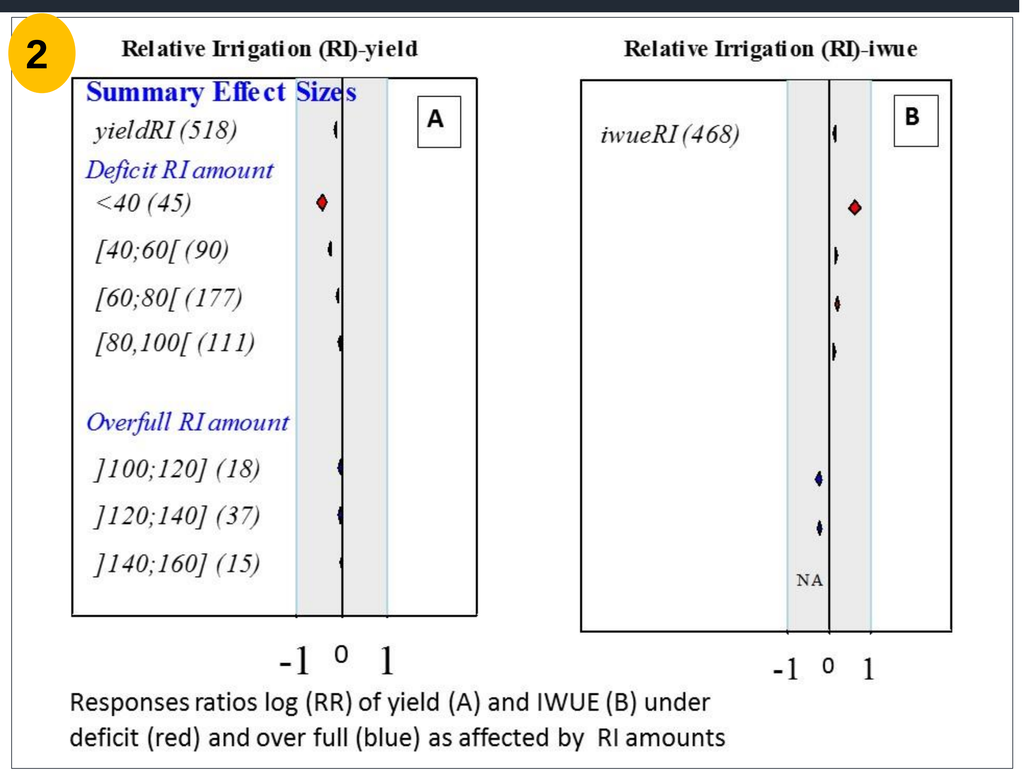
Methods



Flowchart describing literature search and meta-analysis data collection

A total of 518 and 468 observations extracted respectively for yield and IWUE was used with random-effects model to compute response ratio (RR) of vegetable yields and IWUE.

Results



Responses ratios log (RR) of yield (A) and IWUE (B) under deficit (red) and over full (blue) as affected by RI amounts

Yield is most improved when organic fertilizers is applied in combination with mineral fertilizers.

Responses ratios log (RR) of yield (A) and IWUE (B) under deficit (red) and over full (blue) relative irrigation amounts as affected by fertilizer source

Highlights

1. Over full and deficit irrigation have a significant negative impact on vegetable yield (RR DI=-0.1388, p<.0001; RR OFI= 0.0437, p<.0001).
2. Among the different irrigation amount applied, only an application between 50 and 80 % of ETc resulted in the best IWUE.
3. IWUE is improved when DI is applied under pressurized irrigation compared to gravity application while in OFI, both water application methods lead to a significant decrease of IWUE by 240 %.
4. Crop types and production season also negatively impacted yield under DI or OFI, but water productivity is improved under fruit vegetables and spring-summer season.

References

Singh M. *et al.*, 2021. A global meta-analysis of yield and water Productivity responses of vegetables to deficit irrigation. Sci Rep 11, 22095.

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