Research article writing

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Damascus University

Researcher at General Commission for Scientific Agricultural Research- GCSAR- Syria

Importance of scientific writing

- All of us researchers, students , prof ..etc need to write and publish our research (for scientific purposes – for marks – for academic advancement …etc)
- and since it takes long time to get reviewed and get the final decision. You have to make sure that your work or paper will meet the demands and standers of the journal you will contact.

- a way to write your ideas and what you are trying to do
- suitable way to descript your results.
- to publish your knowledge and share it with others.

The main parts of a research paper:

Title

Authors

Abstract

Introduction

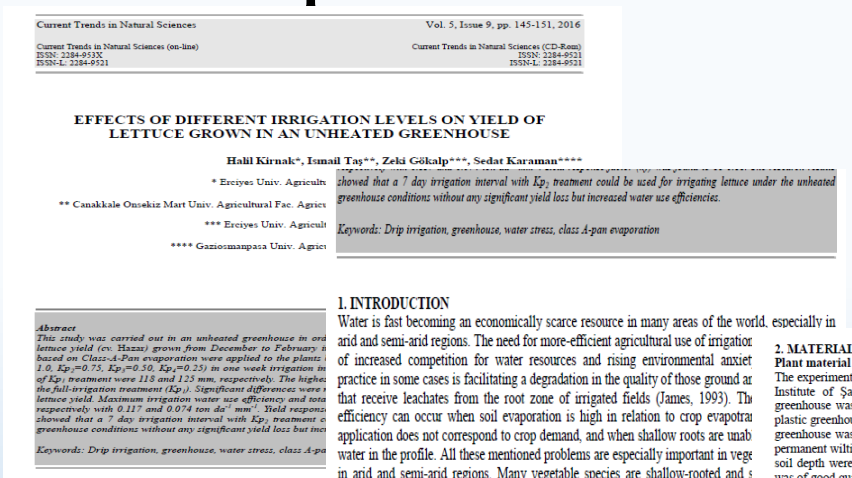
Materials and Methods

Results

Discussion

Conclusion

References



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EFFECTS OF DIFFERENT IRRIGATION LEVELS ON YIELD OF LETTUCE GROWN IN AN UNHEATED GREENHOUSE

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showed that a 7 day irrigation interval with Kp_2 treatment could be used for irrigating lettuce under the unheated greenhouse conditions without any significant yield loss but increased water use efficiencies.

Keywords: Drip irrigation, greenhouse, water stress, class A-pan evaporation

Abstract

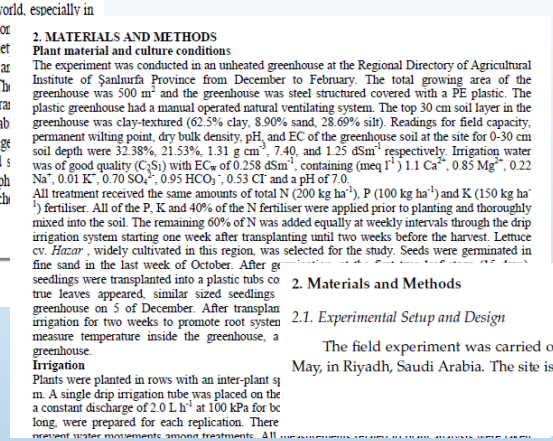
This study was carried out in an unheated greenhouse in ord lettuce yield (cv. Hazar) grown from December to February. based on Class-A-Pan evaporation were applied to the plants 1.0, Kp_2=0.75, Kp_3=0.50, Kp_4=0.25) in one week irrigation in of Kp_1 treatment were 118 and 125 mm, respectively. The highe the full-irrigation treatment (Kp_1). Significant differences were lettuce yield. Maximum irrigation water use efficiency and tota respectively with 0.117 and 0.074 ton da^{-1} mm^{-1}. Yield respons showed that a 7 day irrigation interval with Kp_2 treatment greenhouse conditions without any significant yield loss but inc

Keywords: Drip irrigation, greenhouse, water stress, class A-pa

1. INTRODUCTION

Water is fast becoming an economically scarce resource in many areas of the world, especially in arid and semi-arid regions. The need for more-efficient agricultural use of irrigatio of increased competition for water resources and rising environmental anxiet practice in some cases is facilitating a degradation in the quality of those ground ar that receive leachates from the root zone of irrigated fields (James, 1993). Th efficiency can occur when soil evaporation is high in relation to crop evapotra application does not correspond to crop demand, and when shallow roots are unab water in the profile. All these mentioned problems are especially important in vege in arid and semi-arid regions. Many vegetable species are shallow-rooted and s water stress. In lettuce production, where the harvested part of the plant is the ph area, it is especially important to maintain optimal growth through a well-sch program (Casanova et al., 2009; Ahmed et al., 2000).

http://www.natsci.upit.ro



2. MATERIALS AND METHODS

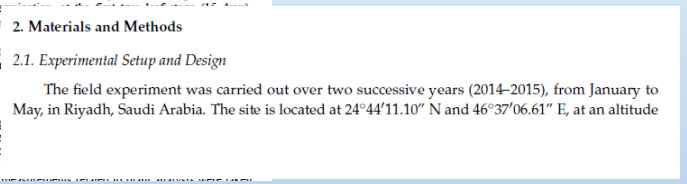
Plant material and culture conditions

The experiment was conducted in an unheated greenhouse at the Regional Directory of Agricultural Institute of Şanlıurfa Province from December to February. The total growing area of the greenhouse was 500 m^2 and the greenhouse was steel structured covered with a PE plastic. The plastic greenhouse had a manual operated natural ventilating system. The top 30 cm soil layer in the greenhouse was clay-textured (62.5% clay, 8.90% sand, 28.69% silt). Readings for field capacity, permanent wilting point, dry bulk density, pH, and EC of the greenhouse soil at the site for 0-30 cm soil depth were 32.38%, 21.53%, 1.31 g cm^{-3}, 7.40, and 1.25 dSm^{-1} respectively. Irrigation water was of good quality (C_2S_1) with EC_w of 0.258 dSm^{-1}, containing (meq l^{-1}) 1.1 Ca^{2+}, 0.85 Mg^{2+}, 0.22 Na^+, 0.01 K^+, 0.70 SO_4^{2-}, 0.95 HCO_3^-, 0.53 Cl^- and a pH of 7.0.

All treatment received the same amounts of total N (200 kg ha^{-1}), P (100 kg ha^{-1}) and K (150 kg ha^{-1}) fertiliser. All of the P, K and 40% of the N fertiliser were applied prior to planting and thoroughly mixed into the soil. The remaining 60% of N was added equally at weekly intervals through the drip irrigation system starting one week after transplanting until two weeks before the harvest. Lettuce cv. *Hazar* , widely cultivated in this region, was selected for the study. Seeds were germinated in fine sand in the last week of October. After g seedlings were transplanted into a plastic tubs co true leaves appeared, similar sized seedlings greenhouse on 5 of December. After transplan irrigation for two weeks to promote root systen measure temperature inside the greenhouse, a greenhouse.

Irrigation

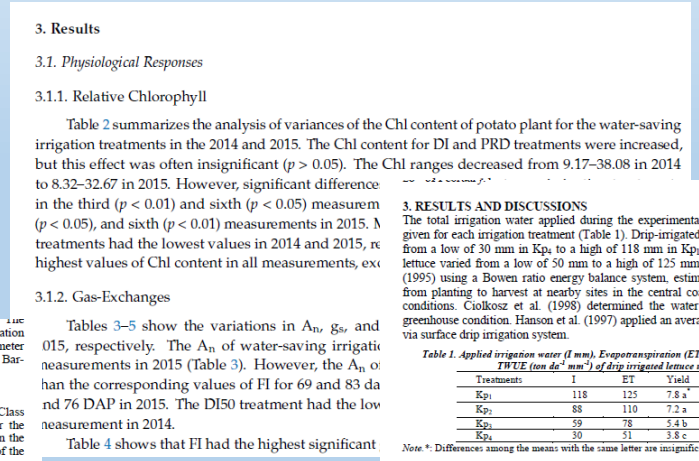
Plants were planted in rows with an inter-plant sp m. A single drip irrigation tube was placed on the a constant discharge of 2.0 L h^{-1} at 100 kPa for bo long, were prepared for each replication. There frequent water movements among treatments. All



2. Materials and Methods

2.1. Experimental Setup and Design

The field experiment was carried out over two successive years (2014–2015), from January to May, in Riyadh, Saudi Arabia. The site is located at 24°44′11.10″ N and 46°37′06.61″ E, at an altitude



3. Results

3.1. Physiological Responses

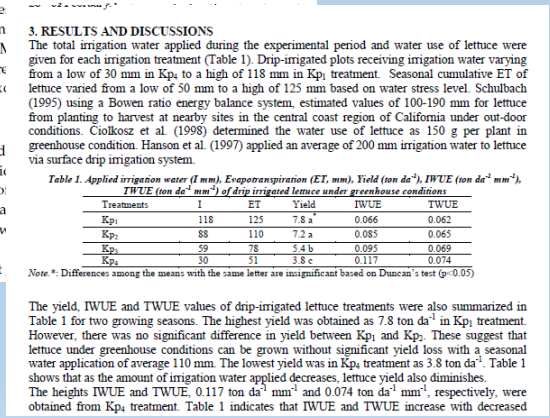
3.1.1. Relative Chlorophyll

Table 2 summarizes the analysis of variances of the Chl content of potato plant for the water-saving irrigation treatments in the 2014 and 2015. The Chl content for DI and PRD treatments were increased, but this effect was often insignificant ($p > 0.05$). The Chl ranges decreased from 9.17–38.08 in 2014 to 8.32–32.67 in 2015. However, significant difference in the third ($p < 0.01$) and sixth ($p < 0.05$) measurem ($p < 0.05$), and sixth ($p < 0.01$) measurements in 2015. M treatments had the lowest values in 2014 and 2015, re highest values of Chl content in all measurements, exc

3.1.2. Gas-Exchanges

Tables 3–5 show the variations in A_n, g_s, and 015, respectively. The A_n of water-saving irrigati measurements in 2015 (Table 3). However, the A_n o han the corresponding values of FI for 69 and 83 da nd 76 DAP in 2015. The DI50 treatment had the low measurement in 2014.

Table 4 shows that FI had the highest significant



3. RESULTS AND DISCUSSIONS

The total irrigation water applied during the experimental period and water use of lettuce were given for each irrigation treatment (Table 1). Drip-irrigated plots receiving irrigation water varying from a low of 30 mm in Kp_4 to a high of 118 mm in Kp_1 treatment. Seasonal cumulative ET of lettuce varied from a low of 50 mm to a high of 125 mm based on water stress level. Schulbach (1995) using a Bowen ratio energy balance system, estimated values of 100-190 mm for lettuce from planting to harvest at nearby sites in the central coast region of California under out-door conditions. Ciolkosz et al. (1998) determined the water use of lettuce as 150 g per plant in greenhouse condition. Hanson et al. (1997) applied an average of 200 mm irrigation water to lettuce via surface drip irrigation system.

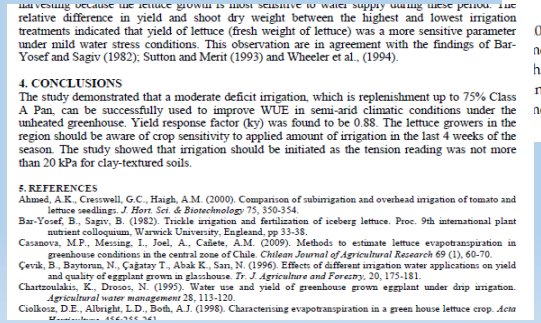
Table 1. Applied irrigation water (I mm), Evapotranspiration (ET, mm), Yield (ton da^{-1}), IWUE (ton da^{-1} mm^{-1}), TWUE (ton da^{-1} mm^{-1}) of drip irrigated lettuce under greenhouse conditions

Treatments	I	ET	Yield	IWUE	TWUE
Kp_1	118	125	7.8 a*	0.066	0.062
Kp_2	88	110	7.2 a	0.085	0.065
Kp_3	59	78	5.4 b	0.095	0.069
Kp_4	30	51	3.8 c	0.117	0.074

*Note.**: Differences among the means with the same letter are insignificant based on Duncan's test ($p=0.05$)

The yield, IWUE and TWUE values of drip-irrigated lettuce treatments were also summarized in Table 1 for two growing seasons. The highest yield was obtained as 7.8 ton da^{-1} in Kp_1 treatment. However, there was no significant difference in yield between Kp_1 and Kp_2. These suggest that lettuce under greenhouse conditions can be grown without significant yield loss with a seasonal water application of average 110 mm. The lowest yield was in Kp_4 treatment as 3.8 ton da^{-1}. Table 1 shows that as the amount of irrigation water applied decreases, lettuce yield also diminishes.

The heights IWUE and TWUE, 0.117 ton da^{-1} mm^{-1} and 0.074 ton da^{-1} mm^{-1}, respectively, were obtained from Kp_4 treatment. Table 1 indicates that IWUE and TWUE increase with decreased



harvesting because the lettuce growth is most sensitive to water supply during these period. The relative difference in yield and shoot dry weight between the highest and lowest irrigation treatments indicated that yield of lettuce (fresh weight of lettuce) was a more sensitive parameter under mild water stress conditions. This observation are in agreement with the findings of Bar-Yosef and Sagiv (1982); Sutton and Merit (1993) and Wheeler et al., (1994).

4. CONCLUSIONS

The study demonstrated that a moderate deficit irrigation, which is replenishment up to 75% Class A Pan, can be successfully used to improve WUE in semi-arid climatic conditions under the unheated greenhouse. Yield response factor (ky) was found to be 0.88. The lettuce growers in the region should be aware of crop sensitivity to applied amount of irrigation in the last 4 weeks of the season. The study showed that irrigation should be initiated as the tension reading was not more than 20 kPa for clay-textured soils.

5. REFERENCES

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Ciolkosz, D.E., Albright, L.D., Both, A.J. (1998). Characterising evapotranspiration in a green house lettuce crop. *Acta*

Main parts of the first page:

Research title : express the main idea about the work.

Author's names , affiliations , E-mails
Determine the main author to contact with

Abstract: include
type of trial , place , time or duration , statistical design , main idea or treatments , main measurements or studied parameters , the most important results , recommendations.

Key words: the most related words to the topic

EFFECTS OF DIFFERENT IRRIGATION LEVELS ON YIELD OF LETTUCE GROWN IN AN UNHEATED GREENHOUSE

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Abstract

This study was carried out in an unheated greenhouse in order to determine effects of different irrigation levels on lettuce yield (cv. Hazar) grown from December to February in Şanlıurfa, Turkey. Different irrigation water amounts based on Class-A-Pan evaporation were applied to the plants by drip irrigation system at four irrigation levels (Kp_1= 1.0, Kp_2=0.75, Kp_3=0.50, Kp_4=0.25) in one week irrigation interval. Applied irrigation water and evapotranspiration of Kp_1 treatment were 118 and 125 mm, respectively. The highest average lettuce yield of 7.8 ton da^{-1} was obtained from the full-irrigation treatment (Kp_1). Significant differences were not observed between Kp_1 and Kp_2 treatments in terms of lettuce yield. Maximum irrigation water use efficiency and total water use efficiency were obtained from Kp_4 treatment respectively with 0.117 and 0.074 ton da^{-1} mm^{-1}. Yield response factor (ky) was found to be 0.88. The research results showed that a 7 day irrigation interval with Kp_2 treatment could be used for irrigating lettuce under the unheated greenhouse conditions without any significant yield loss but increased water use efficiencies.

Keywords: Drip irrigation, greenhouse, water stress, class A-pan evaporation

The Introduction:

The introduction : the literature review :

1- Collecting data (Google scholar – libraries – prof ..etc)
Collect papers related to your work (directly or indirectly)

2- writing stages: 3 main stages:
A- Prewriting stage (collecting information and references).
The longest period (start early)

B- Writing the first draft (the main paper body with collected information from stage A)

C- Revision (checking information – grammar – order …etc)
You can ask for help.

1- Collecting data

1- collecting references → reading → choose which you need → classifying the main topic of each saved part →

Finding suitable way to save the citation of chosen references (like giving numbers)

2- adding similar parts together (the parts talking about one thing)

You can collect them in word documents with specific names

3- rewriting these parts and emerge them in one logic new part includes the studies agreed with your work and the studies disagreed and why.

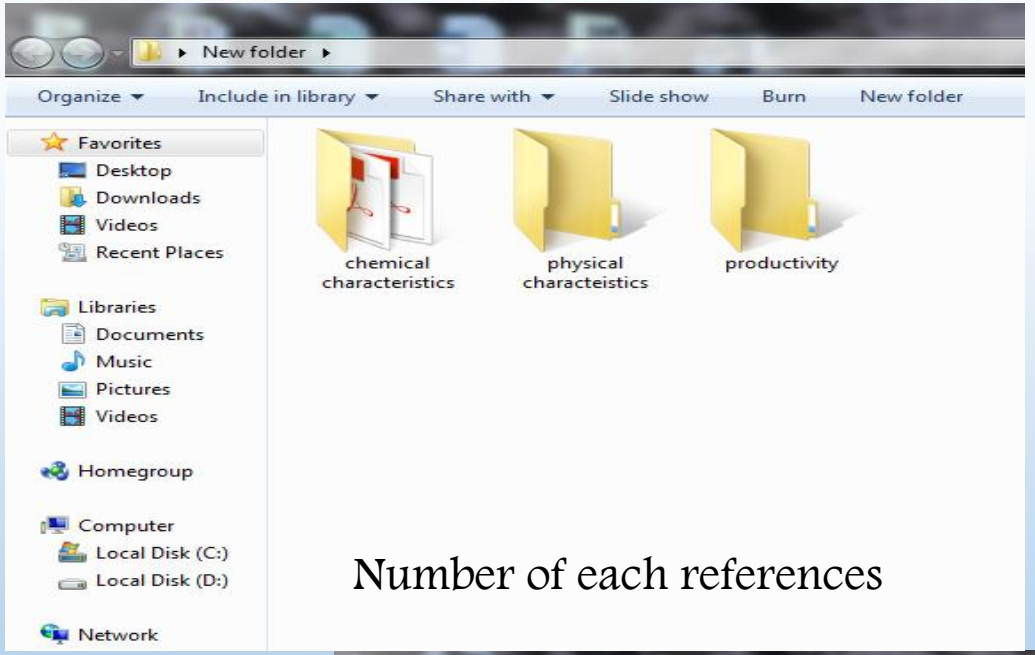
4- adding titles to these paragraphs and give them logic order :

From oldest to newest and from simplest to the most complicated

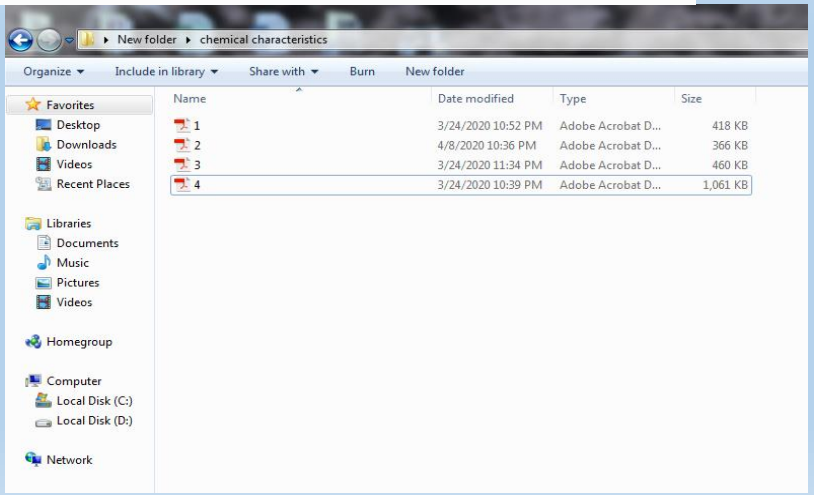
in other words (write a story ..)

Ideas related to collecting data

Main topics



Number of each references



- Results of (Ahmad , 1990) found an increase of 30% in soil bulk density (from 1).
  1 is Ahmad (1990)

Case 1: save the citation of the reference.

- Results of (Ahmad , 1990) found an increase of 30% in soil bulk density (in 1).
  Reference from Ahmad (1990)

Case 2: try to get the original reference or you can write the citation and then add (In: reference no 1)

Writing the first draft
The results:

- start with first result , under the first table start writing the main ideas but:

Be carful:

1. Don't repeat table's content in the text (repetition …rejection), write the general trend of change and mention the most important things.
2. don't use tables and figures to show same results (choose the most suitable type- easy to understand)
3. Don't rewrite the numbers from the table (find another ways to avoid repetition like, using % of change)

- Then : start relate your ideas and give them logic order can make it professional and easy to understand.
- try to join similar results together (increase in BD- FC- TP ..etc)

Materials and methods:

- It consider the most important part of the research:

Wrong methods or equations …..wrong results….paper rejection

- descript your methods so : understandable and able to be repeated and get similar results.
- choose the journal before writing: one part or subtitles.
- you can use tables and figures to descript experimental conditions

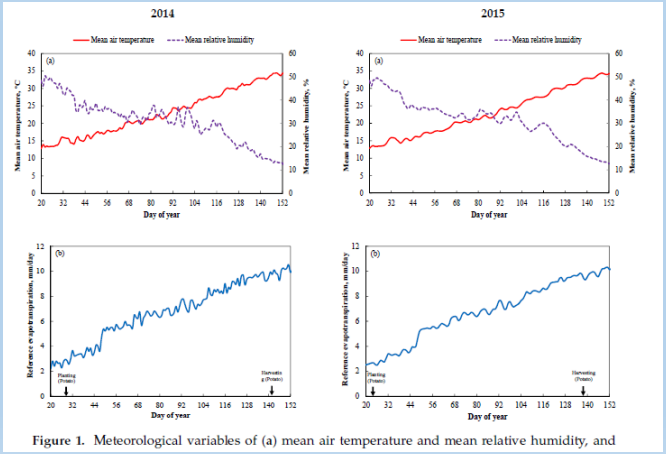


Figure 1. Meteorological variables of (a) mean air temperature and mean relative humidity, and

potatoes was applied to all the treatment plots. The fertilizers comprising of 230 kg/ha N–P_2O_5–K_2O (20–20–20), 200 kg/ha N–P_2O_5–K_2O (10–10–43), 40 L/ha H_3PO_4, and 4 kg/ha microelements, were applied using a drip irrigation system for five successive days each week.

Table 1. Physical properties of soil used in the experiment.

Depth (cm)	Particle Size (%)			Texture	FC (%)	WP (%)	Ks (mm/h)	ρ_b (g/cm³)
	Sand	Silt	Clay					
0–20	71.8	16.3	11.9	sandy loam	14.2	6	37.8	1.6
20–40	66.7	18	15.3	sandy loam	17.1	8.1	24.6	1.6
40–60	69.1	18.3	12.6	sandy loam	18.5	9.9	19.6	1.6

FC: field capacity; WP: wilting point; Ks: saturated hydraulic conductivity; ρ_b: bulk density.

The experimental area was 675 m² (45 m × 15 m) and was divided into three replicate fields. Each field of area 195 m² (13 m × 15 m) included five irrigation treatments: FI with 100% of ET, DI70 and

ficiency (IWUE) and the ratio of the irrigation water in ET (I_c) were examined.

MATERIALS AND METHODS

The study was carried out between February and April of 2011 in plastic covered greenhouse which had 96 m² surface area and the long axis placed in the east-west direction in Agricultural Research and Experimental Center at the Campus of Süleyman Demirel University, Isparta, Turkey. The study area was between 37° 50′ 23″ N latitude and 30° 32′ 02″ E longitude and 1010 m altitude. The Isparta region indicates a transition characteristic between the Mediterranean climate and Middle Anatolian continental climate. It resembles the Mediterranean climate in terms of precipitation regime, while it resembles the Middle Anatolian continental climate in terms of temperature since summer season is hot and dry, and winter season is cold and snowy. In Isparta, long-term average annual temperature, relative humidity, wind speed and precipitation are 12 °C, 61%, 1.9 m s⁻¹ and 520 mm, respectively [TSMS, 2008]. Automatic recorders

2. Materials and Methods

2.1. Experimental Setup and Design

The field experiment was carried out over two successive years (2014–2015), from January to May, in Riyadh, Saudi Arabia. The site is located at 24°44′11.10″ N and 46°37′06.61″ E, at an altitude

Notes:

- use standard methods.
- the newest and most advances methods.
- use references you searched for to collect needed information about things you are studying.
- Get the original references of the method.
- statistical design: type – treatments – replications (make sure it can be analyzed)
- Statistical analysis: type – program - version
  - using additions like Duncan letters.

Irrigation Treatments	Number of Stems Per Plant	Marketable Tuber Ratio (%)	Tuber Peel Ratio (%)	Plant Height (cm)	Yield (t/ha)
K(IIII)	5.70a	87.25a	6.75a	69.50a	33.64a
$K(III_{50})$	5.15ab	82.05ab	6.10a	64.20ab	33.57a
$K(III_{50}I)$	4.75bcd	77.90bc	5.65ab	58.40bc	32.55a
$K(II_{50}II)$	4.85bc	78.20bc	5.75ab	59.95bc	33.21a
$K(II_{50}I_{50}I_{50})$	4.00de	66.40de	4.15c	47.00de	24.28bc
$K(I_{50}III)$	4.95abc	79.65ab	5.90ab	60.75b	33.39a
$K(I_{50}II_{50}I_{50})$	4.25cde	69.50d	4.90bc	50.70d	30.32ab
$K(I_{50}I_{50}II_{50})$	4.45bcd	70.40cd	4.95bc	52.70cd	31.71ab
$K(I_{50}I_{50}I_{50}I)$	3.60e	61.25e	3.85cd	42.45e	18.10cd
$K(I_{50}I_{50}I_{50}\ I_{50})$	2.85f	53.00f	2.90d	33.10f	11.51d
Treatments	**	**	**	**	**
Blocks	ns	ns	ns	ns	ns

Introduction structure

- the aim of the introduction is to convince the reviewer or the reader and show the importance of this paper.
- we build it be writing the known information about the topic (what previous studies discover and report about it).
- the new thing this study will add
- objective of the study (aim or aims)
- its importance in the future (open new door- give new opportunities)

will help to grow potato in dry areas ..etc.

- ideas order should be from old to new , and from simple to complicated.

Abstract

- Very important: The first you will read after the title:
- Most of researchers decide in depend on the abstract if you will continue reading or not.
- some journals ask for detailed abstract while other prefer short one (100-300 word).
- 6 paragraphs.

Discussion

- It consist of 3-6 paragraphs : The final big picture of the results

Writing an attractive story by finding the relations between the studies parameters (interesting to read – logic to understand).

- Discussing with previous studies (agree or disagree and why)/ (from old to new).
- Put your findings between (previous studies and studies will be continued of accomplish in the future).
- don't be afraid of mention unique and unpredicted results ..find possible explanations.

conclusion

- One paragraph :

First sentence : about the importance of the study

The most important result

The unique of this result

Possible application to this result and if there are any missed parts should be covered in the future.

The questions should be answered in the future and If you need further studies on other related issues

order of writing

After Collecting data and analyze it

Writing the results

the materials and methods

Introduction

Discussion

Abstract

Title

authors

References

Tenses of writing: simple past (for ended actions and studies)

simple present (for descripting results)

Passive voice (for methodology)