Evaluation of the effect of plant growth retardants on vegetative growth, yield components, seed quality and crop maturity of kabuli chickpea

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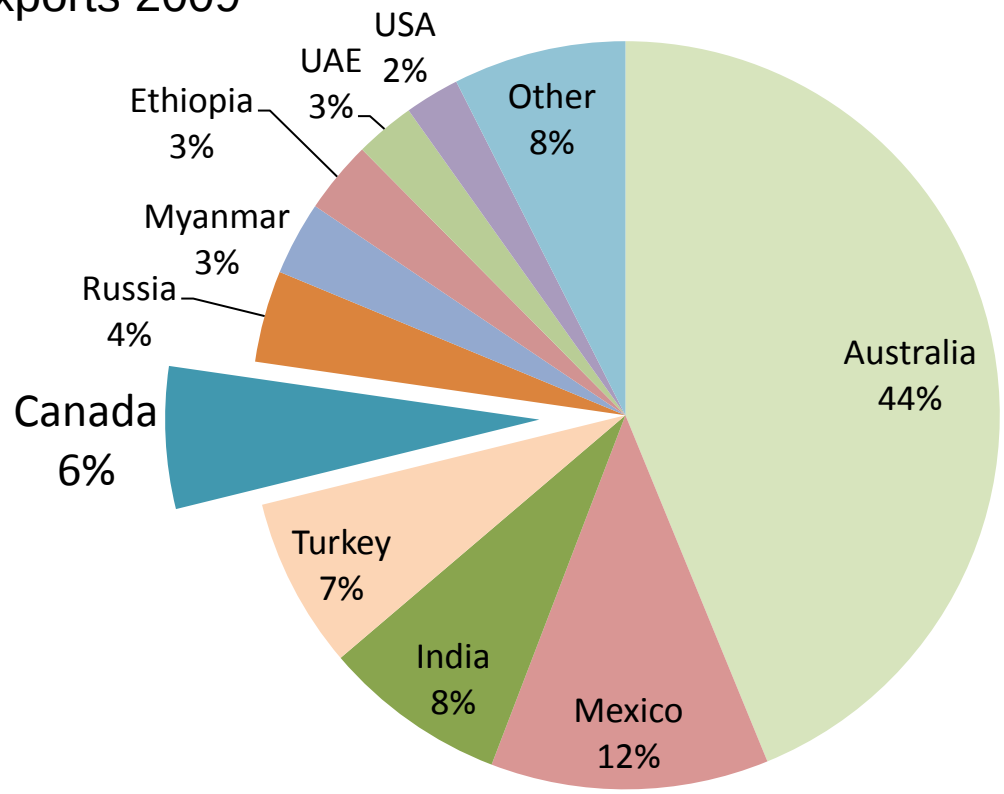
Chickpea in Canada

World chickpea exports 2009



Canadian chickpea production 2010

- Total production 128,300 tonnes
- Harvested area 76,900 Ha

http://faostat.fao.org

Major constraints for chickpea production in Western Canada

- Disease (*Ascochyta* blight)

- Problems associated with maturity
  - Indeterminate growth habit (secondary vegetative growth)
  - Short growing season
  - Climatic conditions

Hypotheses

Plant growth retardants can;

- ❑cease the secondary vegetative growth of chickpea.
- ❑increase the percentage of marketable seeds

Objectives

Evaluate the effects of plant growth retardants on;

- Vegetative growth
- Yield components
- Seed quality
- Crop maturity

Materials and Methods

Plant growth retardants selected for the study

PGR	Trade name	Group	Manufacturer
Chlormequat chloride	Cycocel®	Onium compounds (block formation of CDP)	BASF
Prohexadione calcium	Apogee®	Acylcyclohexadiones (block GA_1 formation)	BASF
Trinexapac ethyl	Palisade®		Syngenta

Treatments

(i) Plant growth retardants

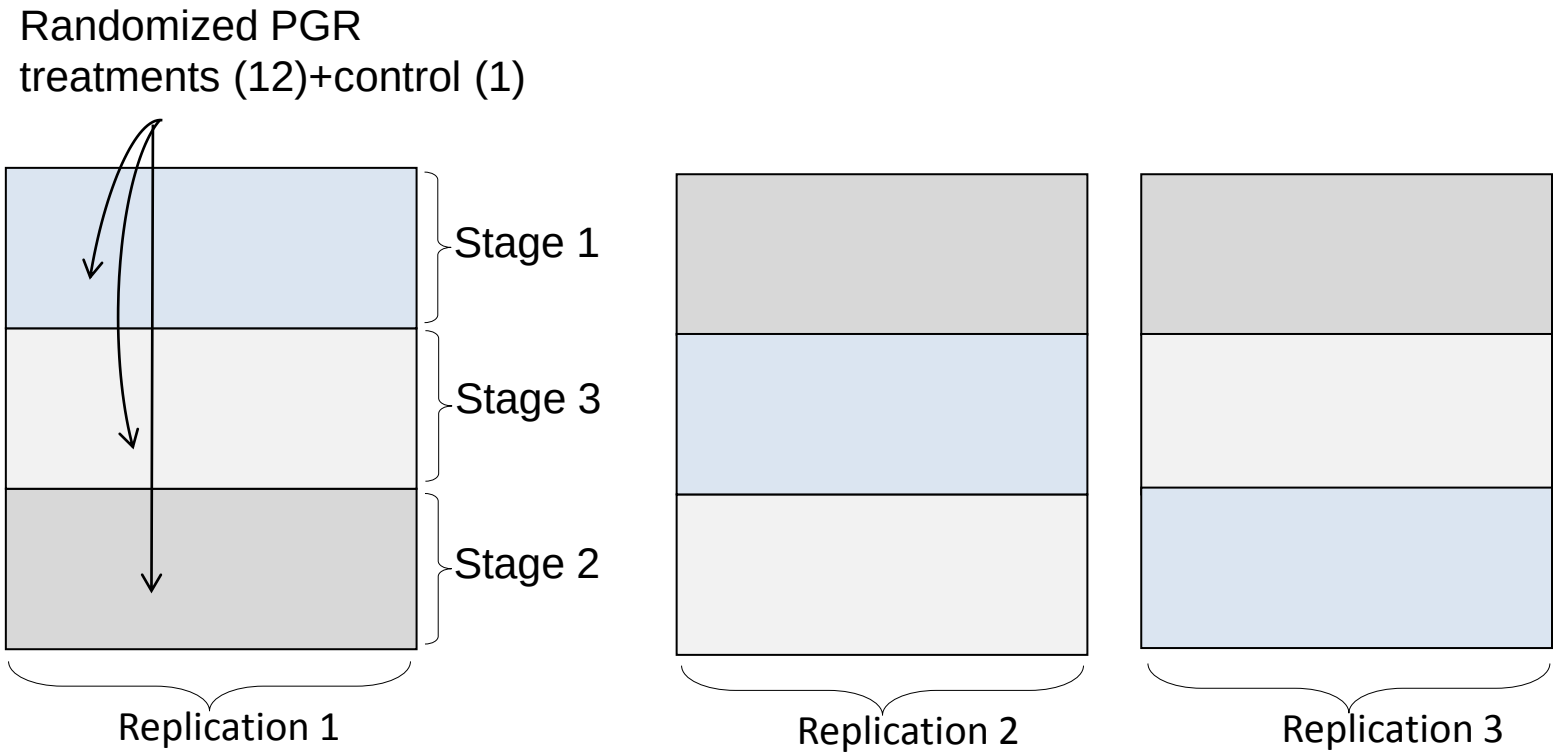
PGR	Rate1	Rate2	Rate3	Rate4
Prohexadione Ca (Apogee®)	750ppm	1500ppm	3000ppm	4500ppm
CCC (Cycocel®)	1000ppm	2000ppm	4000ppm	6000ppm
Trinexapac Ethyl (Palisade®)	2083ppm	4167ppm	8333ppm	12498ppm

(ii) Time of application

Time of application	
Stage 1	10 days after 50% plants/plot bearing flowers
Stage 2	10 days after 1st PGR treatment
Stage 3	10 days after 2nd PGR treatment

Experimental design

Split plots in factorial randomized complete block design was used for the field trials.



The variety used – CDC Frontier

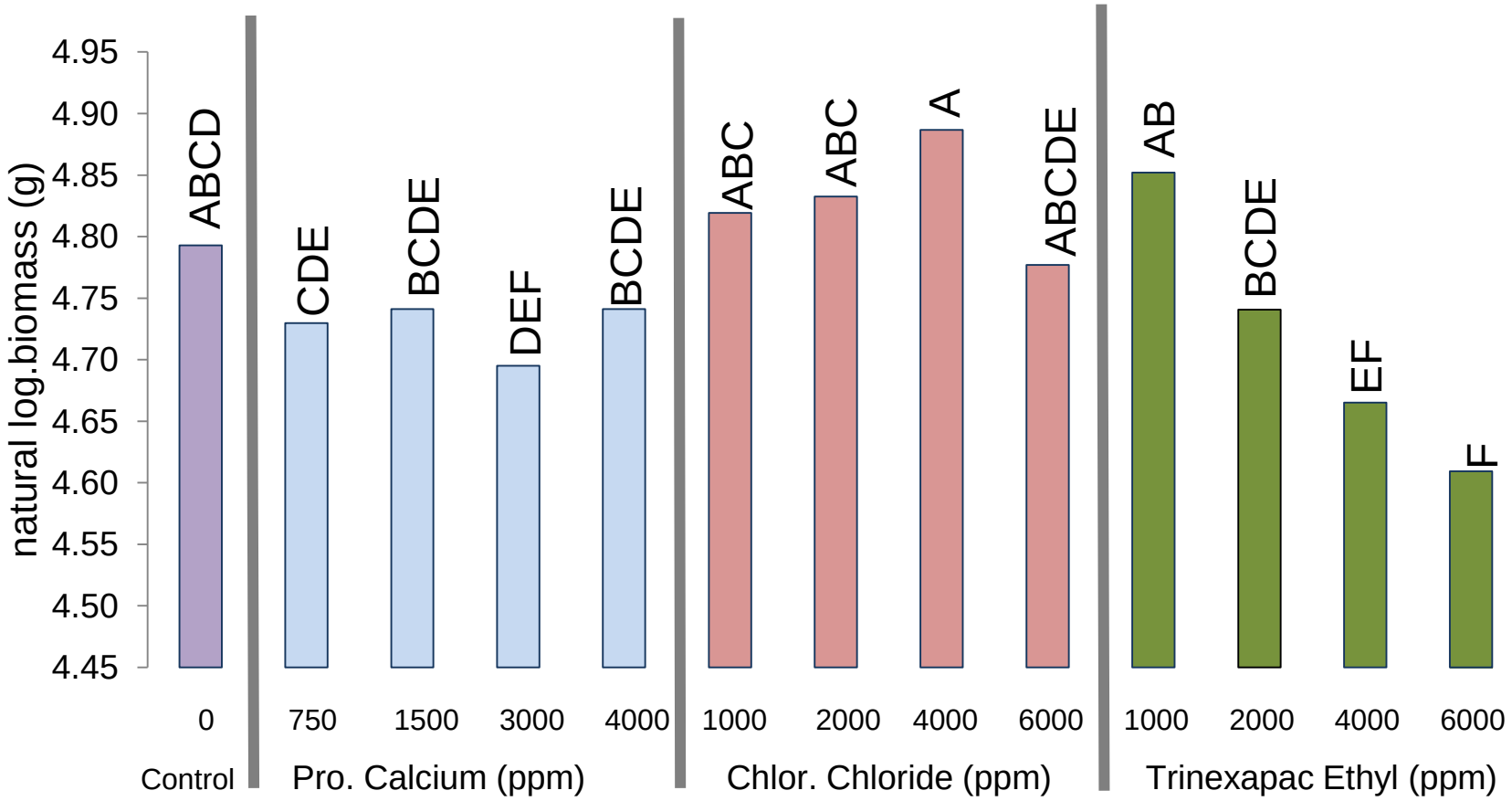
20 DAF treatment application at Brooks, AB on 03 Aug 2010

Results

Statistical analysis - 2010

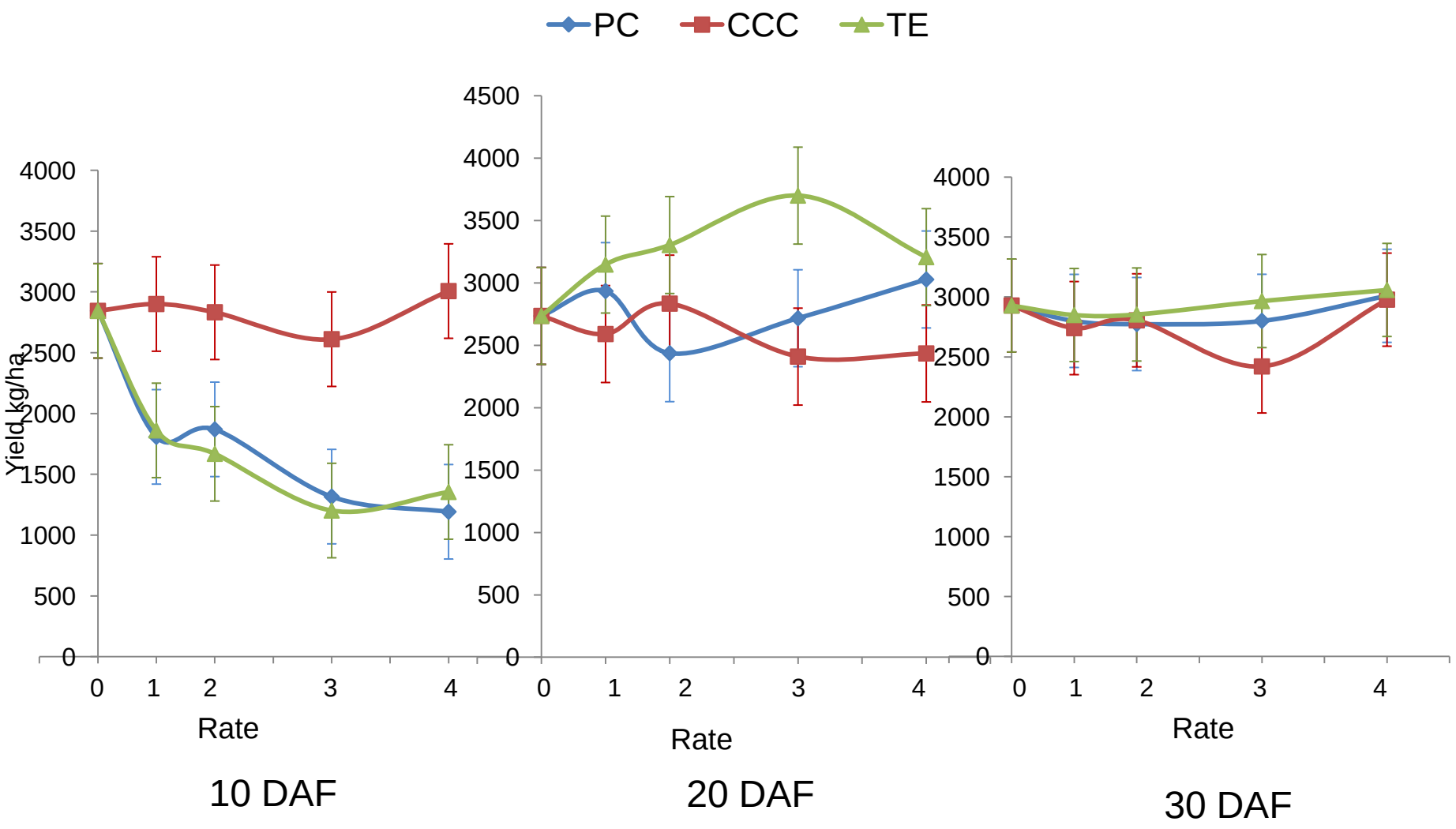
	Plant height	Biomass	1000 seed weight	Seed yield	Marketable seed yield	Harvest index
location	*	ns	ns	*	*	*
fungicide	ns	ns	ns	ns	ns	ns
stage	**	ns	ns	**	**	*
pgr	**	**	ns	**	**	ns
location x fungicide	ns	ns	ns	ns	ns	ns
location x stage	**	ns	ns	ns	ns	**
fungicide x stage	ns	ns	ns	ns	ns	ns
location x pgr	**	ns	ns	*	*	ns
fungicide x pgr	*	ns	ns	ns	ns	ns
stage x pgr	**	ns	ns	**	**	**
location x fungicide x stage	ns	ns	ns	ns	ns	ns
location x fungicide x pgr	ns	ns	ns	ns	ns	ns
location x stage x pgr	*	ns	ns	ns	ns	ns
fungicide x stage x pgr	*	ns	ns	ns	ns	ns
Loc. x fungicide x stage x pgr	ns	ns	ns	ns	ns	ns

Biomass

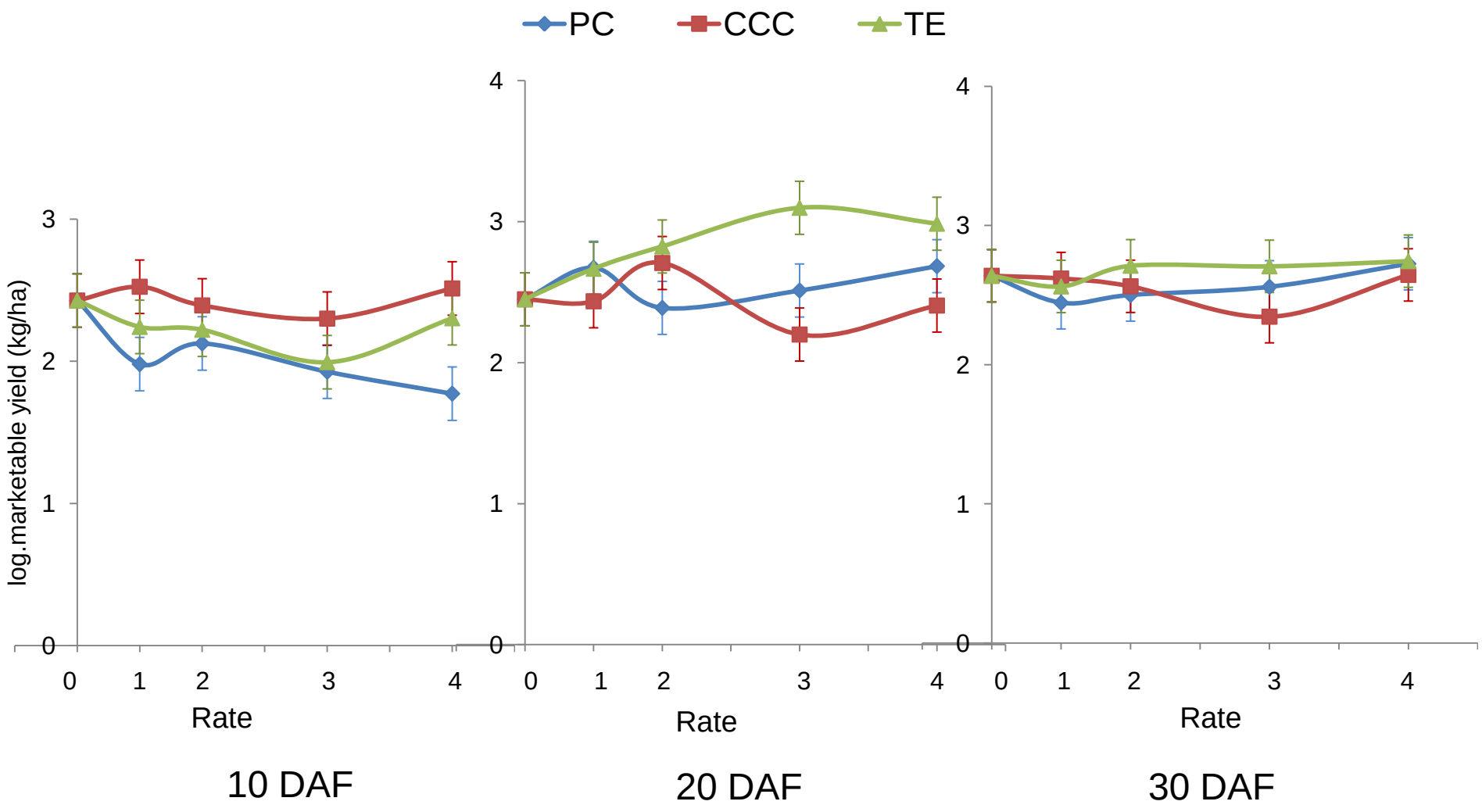

natural log.biomass (g)
4.95
4.90
4.85
4.80
4.75
4.70
4.65
4.60
4.55
4.50
4.45
ABCD
CDE
BCDE
DEF
BCDE
ABC
ABC
A
ABCDE
AB
BCDE
EF
F
0
750
1500
3000
4000
1000
2000
4000
6000
1000
2000
4000
6000
Control
Pro. Calcium (ppm)
Chlor. Chloride (ppm)
Trinexapac Ethyl (ppm)


CONTROL
TRINEXAPAC ETHYL

Seed yield


PC
CCC
TE
Yield kg/ha
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
4
Rate
10 DAF
20 DAF
30 DAF

Marketable seed yield



Summary

- Trinexapac ethyl is the most effective PGR to control vegetative growth of chickpea.
- Acylcyclohexadione type PGRs effectively control vegetative growth of chickpea.
- Impact of PGR on chickpea yield and marketable yield depend on the time of application.
- There is a potential to use trinexapac ethyl to boost chickpea yield. This has to be further investigated.

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THANK YOU!