INCREASING GROWTH AND PROTEIN IN MUNG BEAN AND SUNFLOWER MICROGREENS BY COMPARING SOURCES OF NITROGEN FERTILIZER

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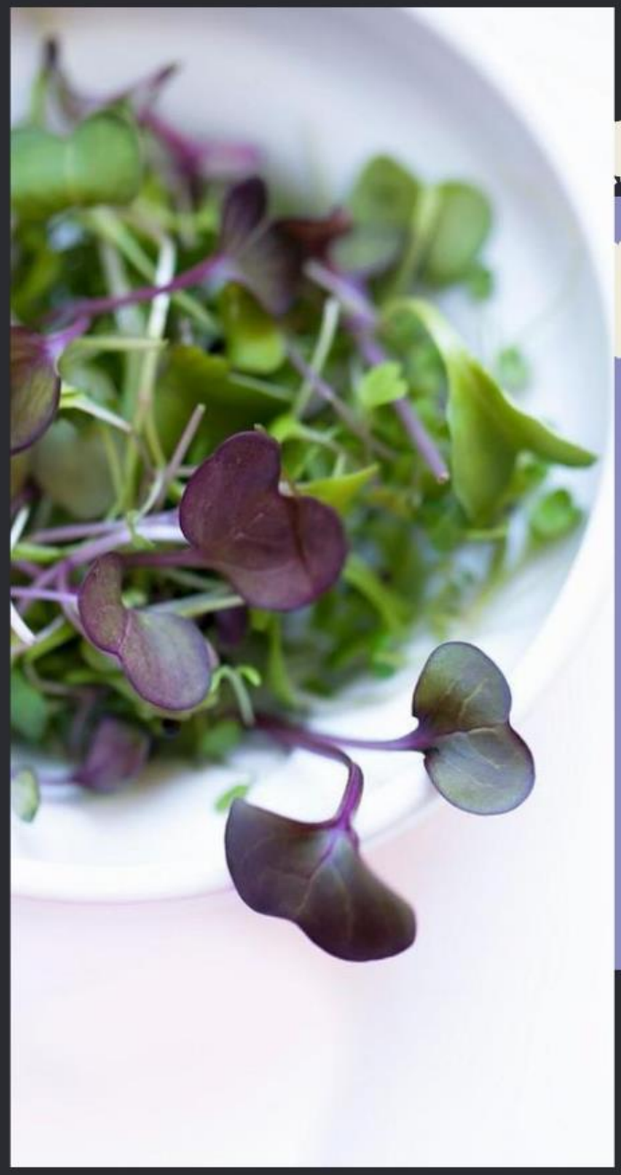
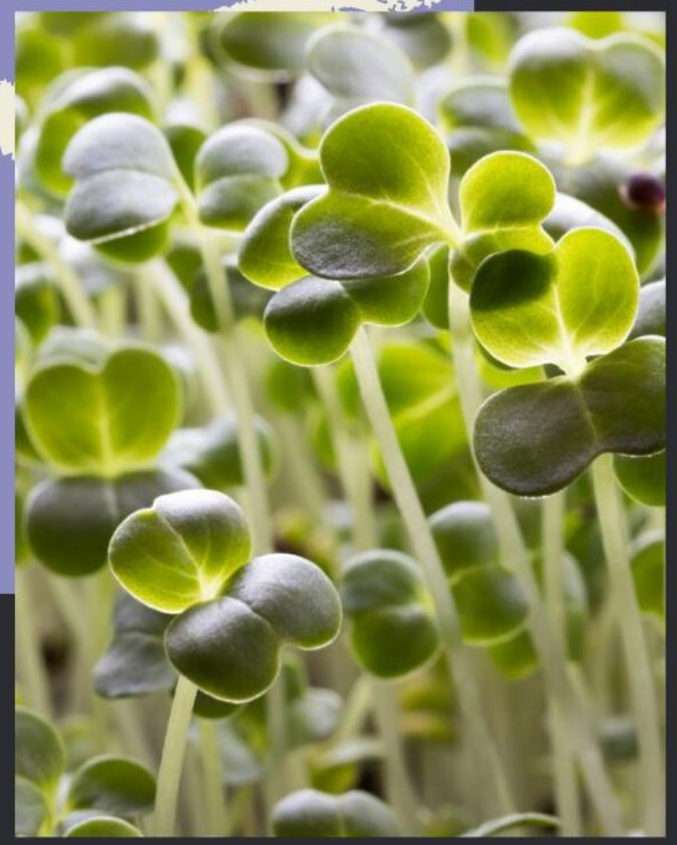
BACKGROUND & RATIONALE OF PROJECT

- It is the seedling of vegetables and herbs.
- It has one pair of very small, partially developed true leaves.
- Microgreen has higher concentration of phytonutrients in comparison with mature leaves from same plant species





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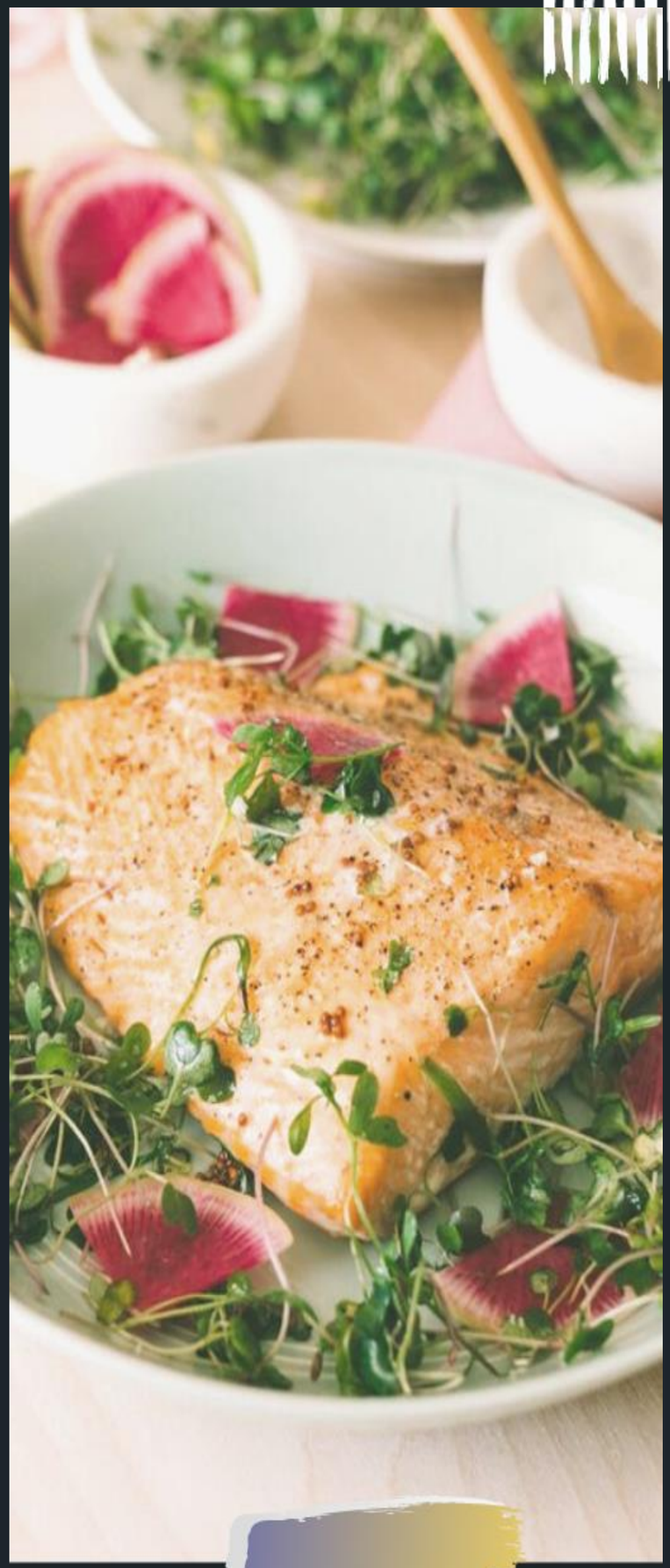
https://www.amazon.com/Mung-seeds-Amazing-Asian-Moong/dp/B0722V1Z7H



BACKGROUND & RATIONALE OF PROJECT

- Small seeds and able to grow in compact container and can grow within one week
- Mung beans are one of the best plant based sources of protein. They are rich in essential amino acids (Jillian Kubala, 2018).
- It contains cancer fighting compounds (Murello et al., 2001).

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OBJECTIVE

" To compare growth and protein in mung bean and sunflower microgreens with different sources of nitrogen fertilizer "

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METHODOLOGY

Plant material preparation

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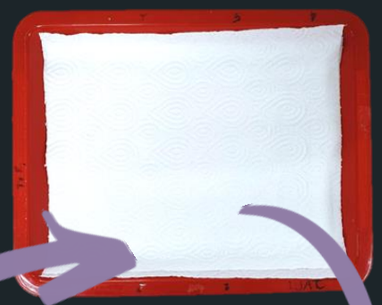
Use a soldering iron to bore the trays.

Prepare 15 trays with the size of 33×25×5 cm

Place 8 layers of tissue on those trays and water them with distilled water.

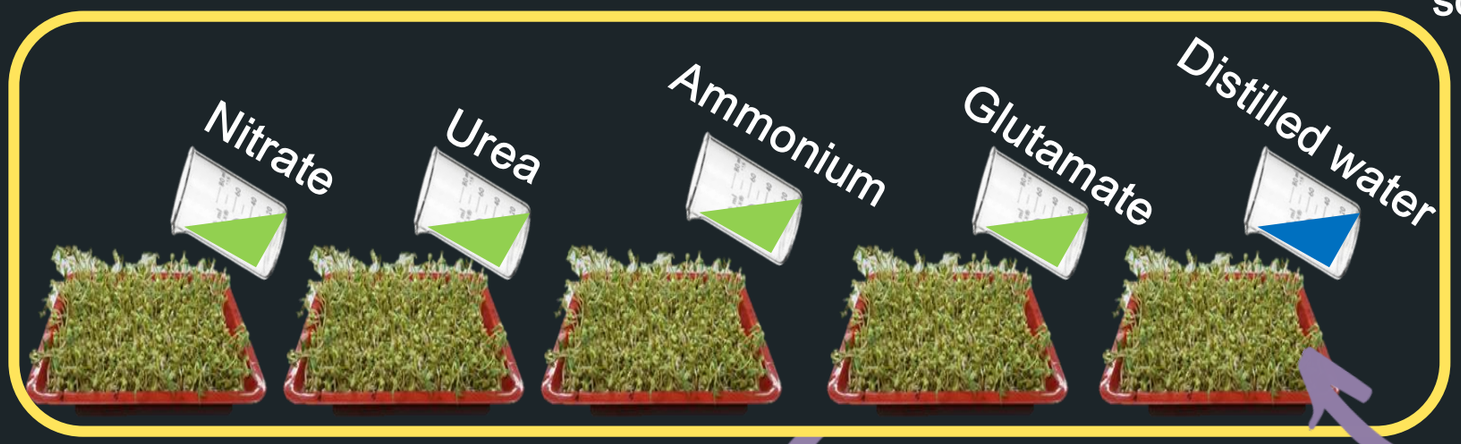


Sprinkle 50 g. the soaked seeds on tissue layers on each tray.

Soak for 6 hr. in 60 ºc warm water

Cover each tray with a layer of tissue and thin fabric.

Put in a plastic bag



Leave and give controlled red blue LED light for 2 days

METHODOLOGY

Fertilizer preparation

sources of nitrogen fertilizer

FERTILIZER	g/5 L of water
SOLUTION A	
Potassium nitrate	390
Magnesium sulphate	250
Monopatassium phosphate	50
Monoammonium phosphate	65
Manganese sulphate	4
microelements	25
SOLUTION B	
Calcium nitrate	500
Iron chelate	25

Treatment 1 : Nitrate fertilizer solution
Treatment 2 : Ammonium fertilizer solution
Add 1.316 grams of ammonium sulphate
Treatment 3 : Urea fertilizer solution
Add 2.561 grams of urea fertilizer
Treatment 4 : Glutamate fertilizer solution
Add 3.365 grams of monosodium glutamate
Controlled treatment : distilled water

Pipette 10 mL of solution A and B and dilute into 1 L

Stock A and B of fertilizer applied with 10 liters of deionized water

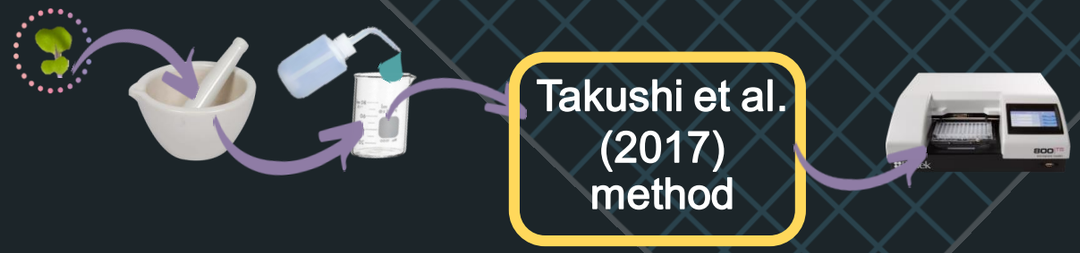
METHODOLOGY

PARAMETER ANALYSIS

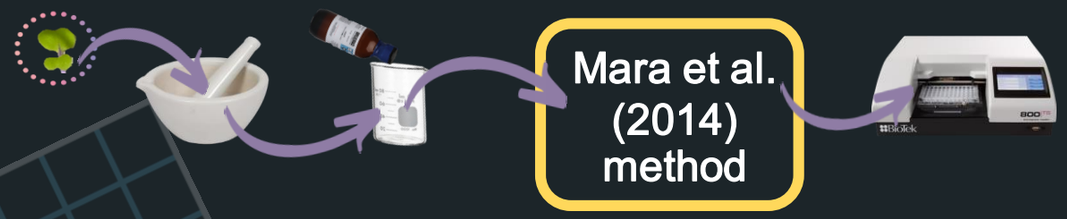
Fresh weight

Dry weight

Nitrate and Nitrite

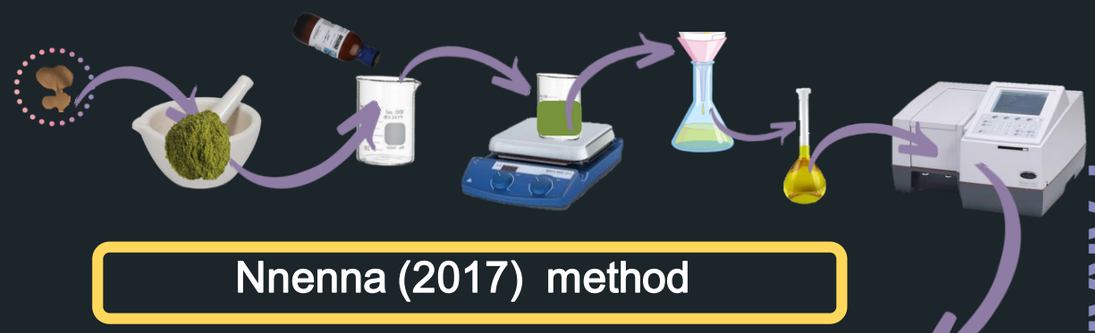


Chlorophyll (A&B) Carotenoid and Xanthophyll



Ammonium

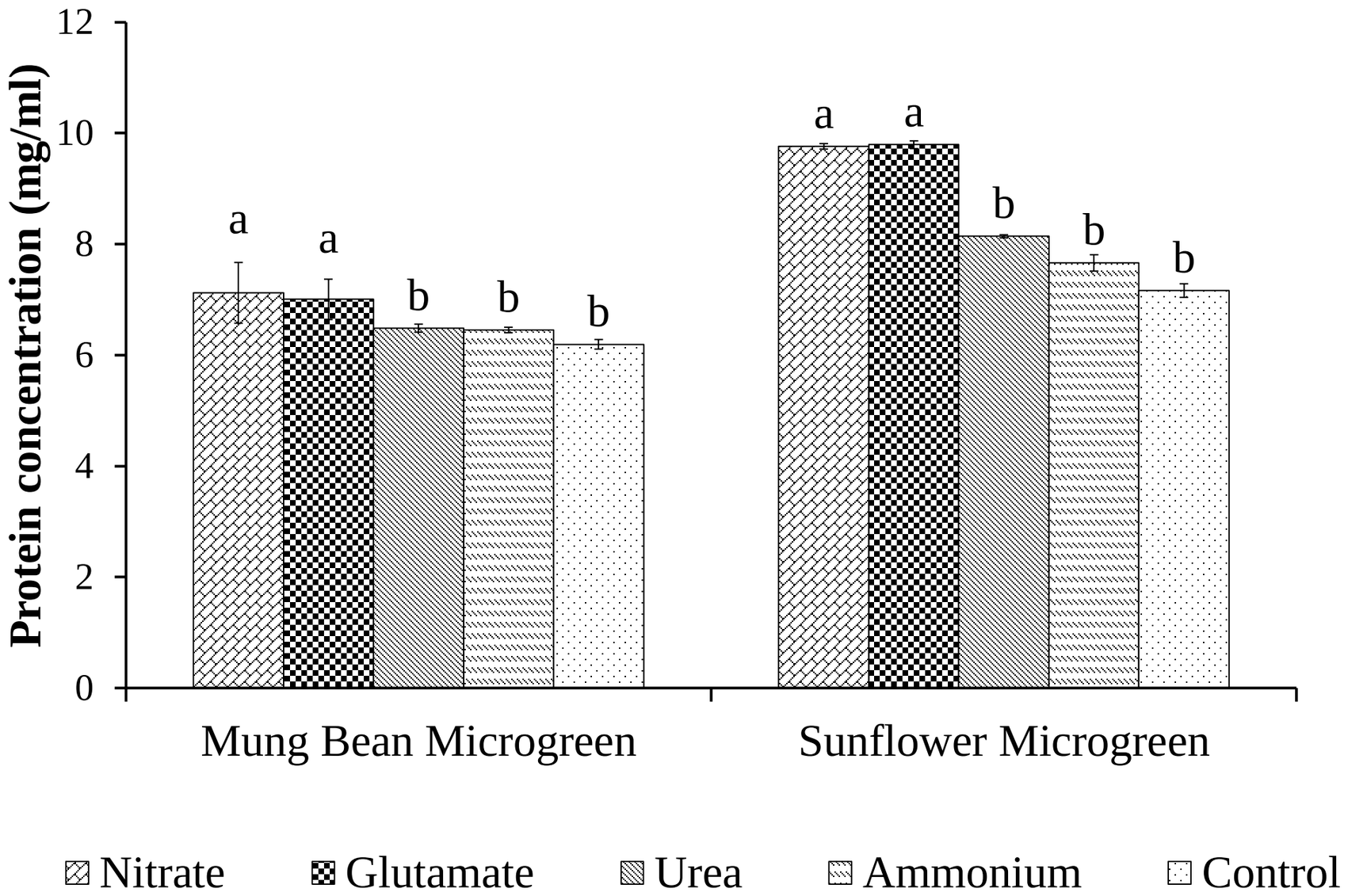
Amino acids and Total Protein



Wavelength range	Identified amino acid
204-220	Cys
240-265	Phe
274-330	Tyr
275-312	Trp
Above 312	His

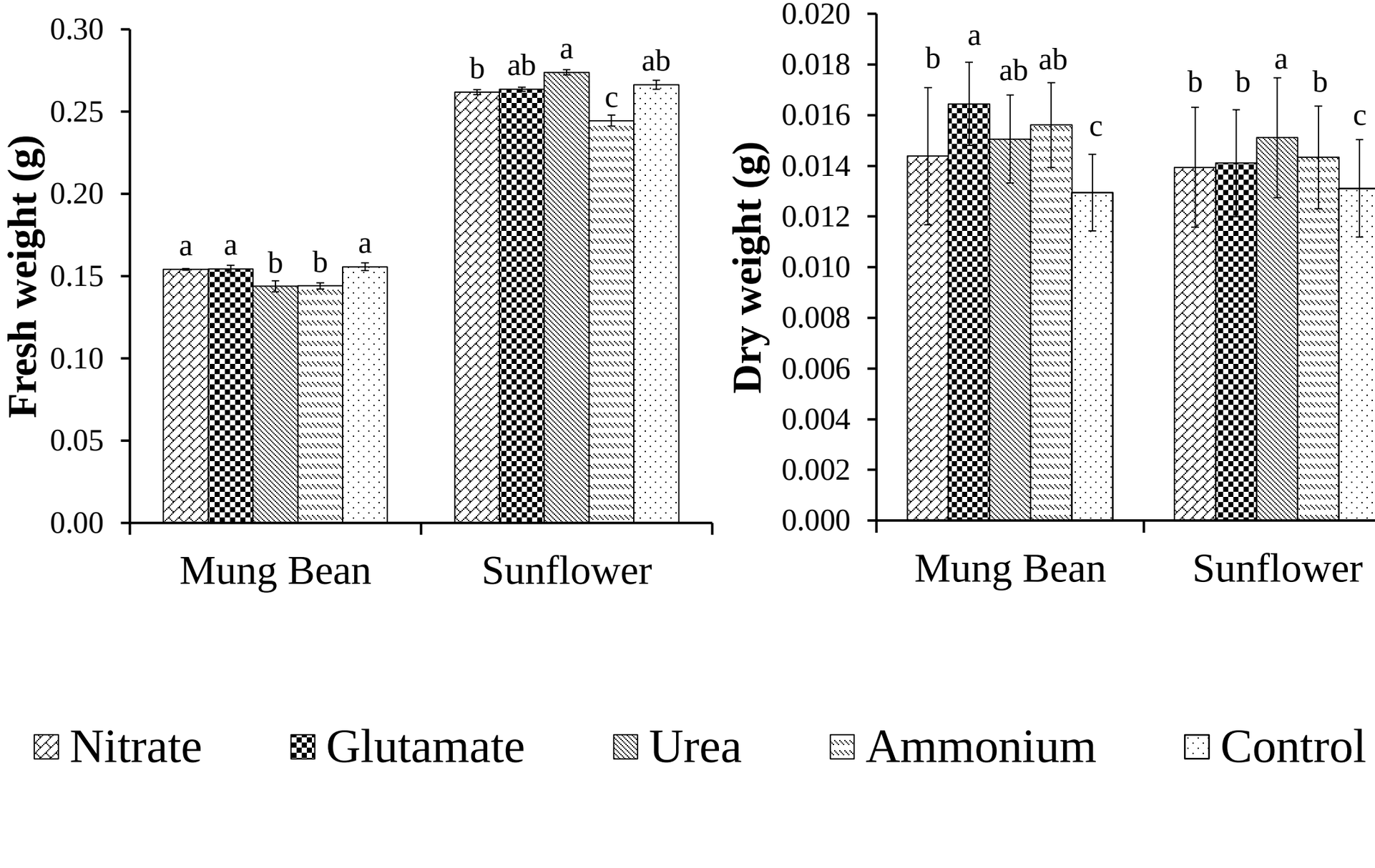
RESULTS

DETERMINATION OF TOTAL PROTEIN



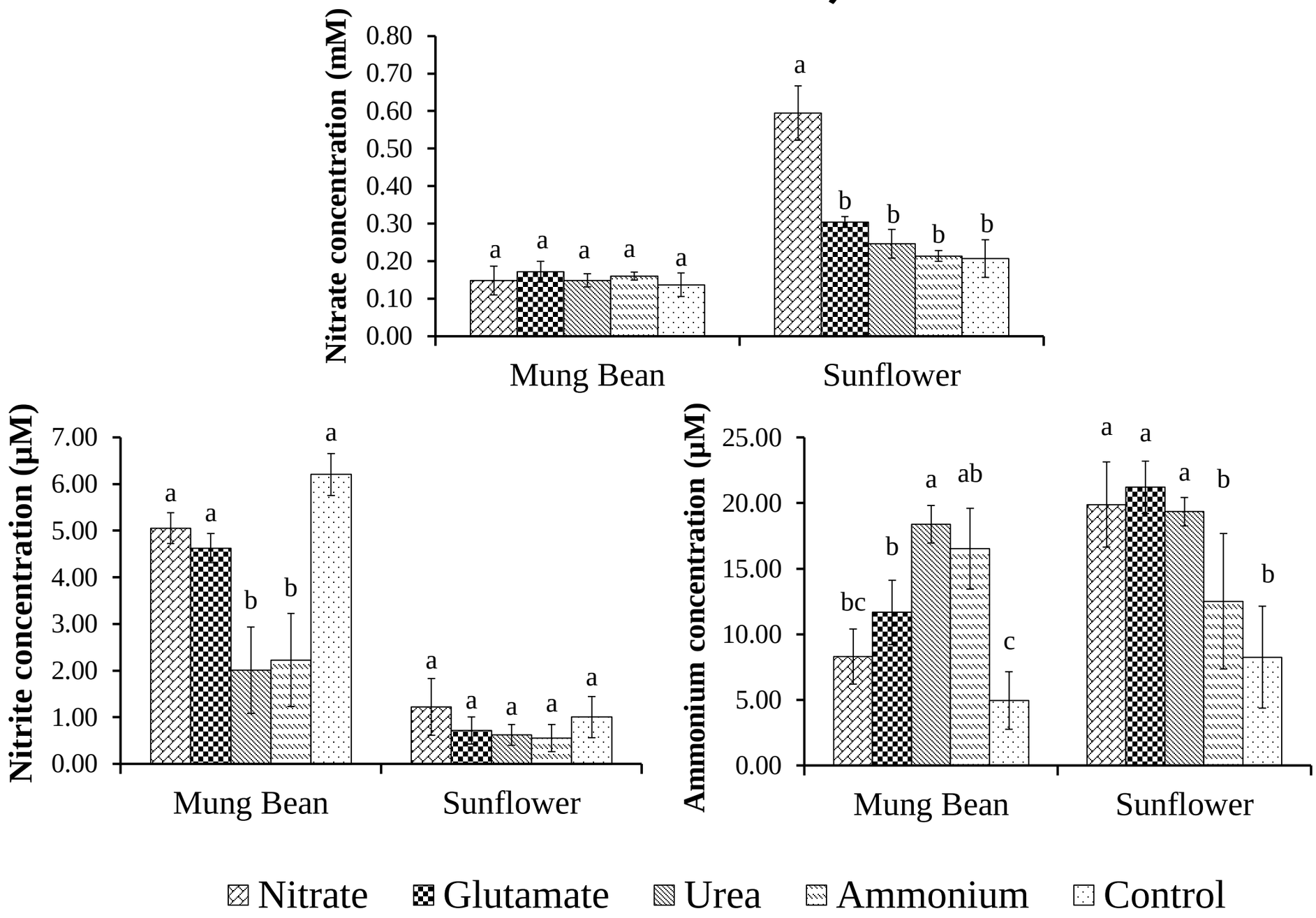
RESULTS

FRESH WEIGHT AND DRY WEIGHT



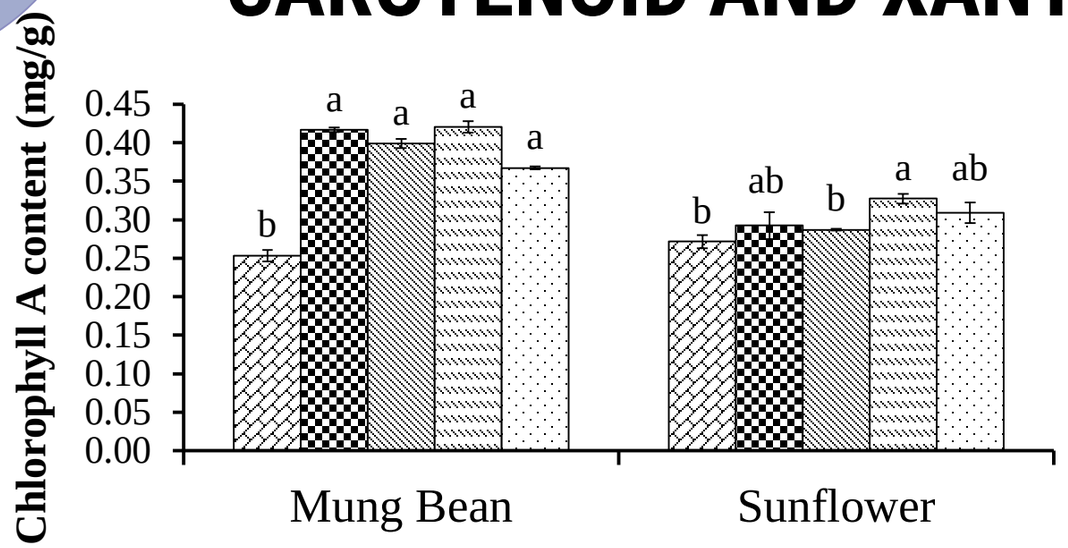
RESULTS

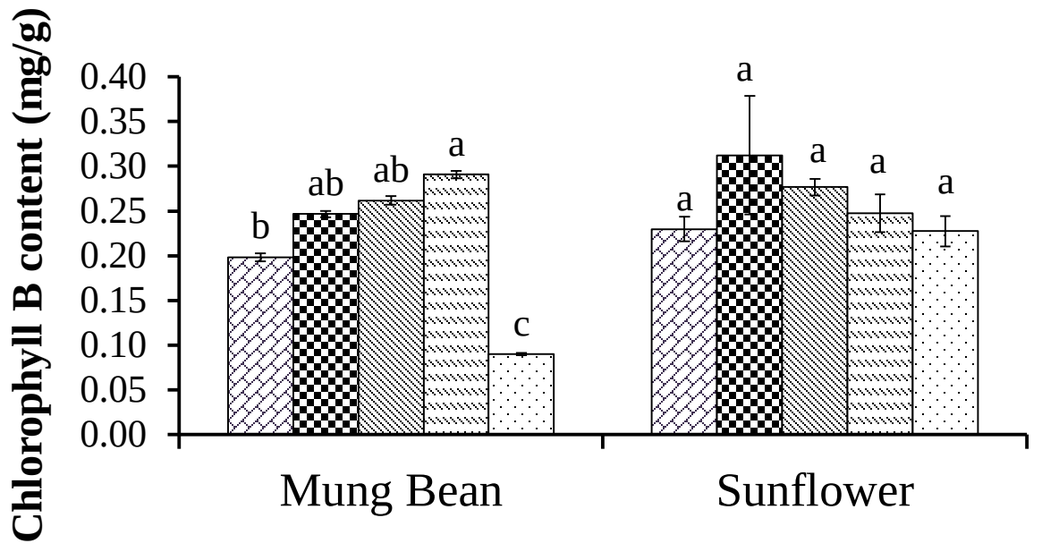
DETERMINATION OF NITRATE, NITRITE AND AMMONIUM

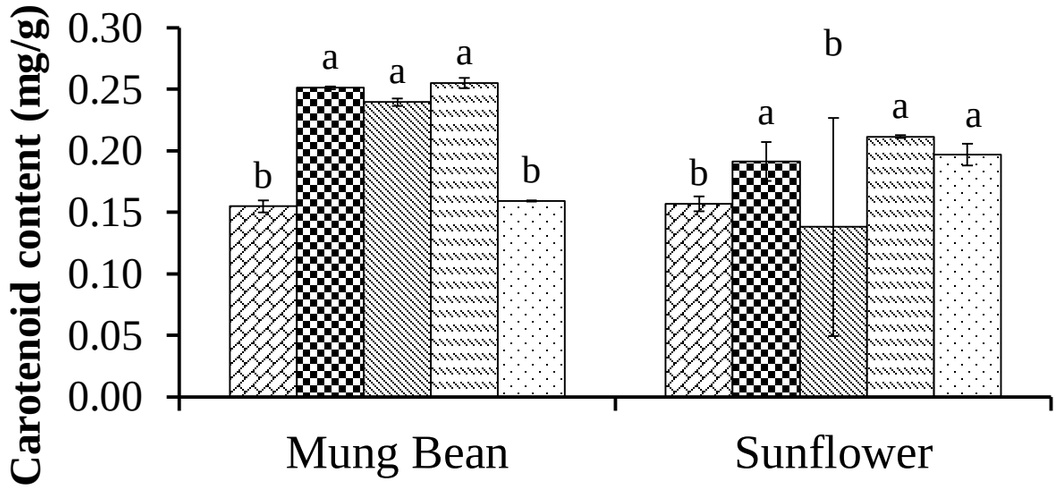


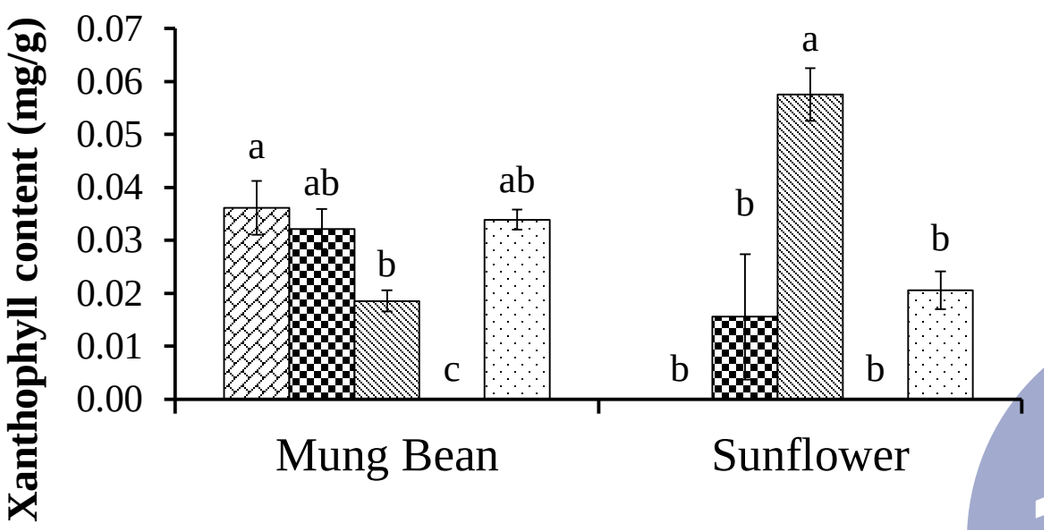
RESULTS

DETERMINATION OF CHLOROPLYLL A, CHLOROPHYLL B, CAROTENOID AND XANTHOPHYLL









Nitrate Glutamate Urea Ammonium Control

RESULTS

MEASURING OF AMINO ACIDS

Sample	Treatments	Cysteine	Phenylalanine	Tyrosine	Tryptophan
Mung Bean	Nitrate	-	+	+	+
	Glutamate	+	+	+	+
	Urea	+	-	+	+
	Ammonium	+	-	+	+
	Control	+	-	+	+
Sunflower	Nitrate	-	-	+	+
	Glutamate	+	+	+	+
	Urea	+	-	+	+
	Ammonium	+	-	+	+
	Control	+	-	+	+

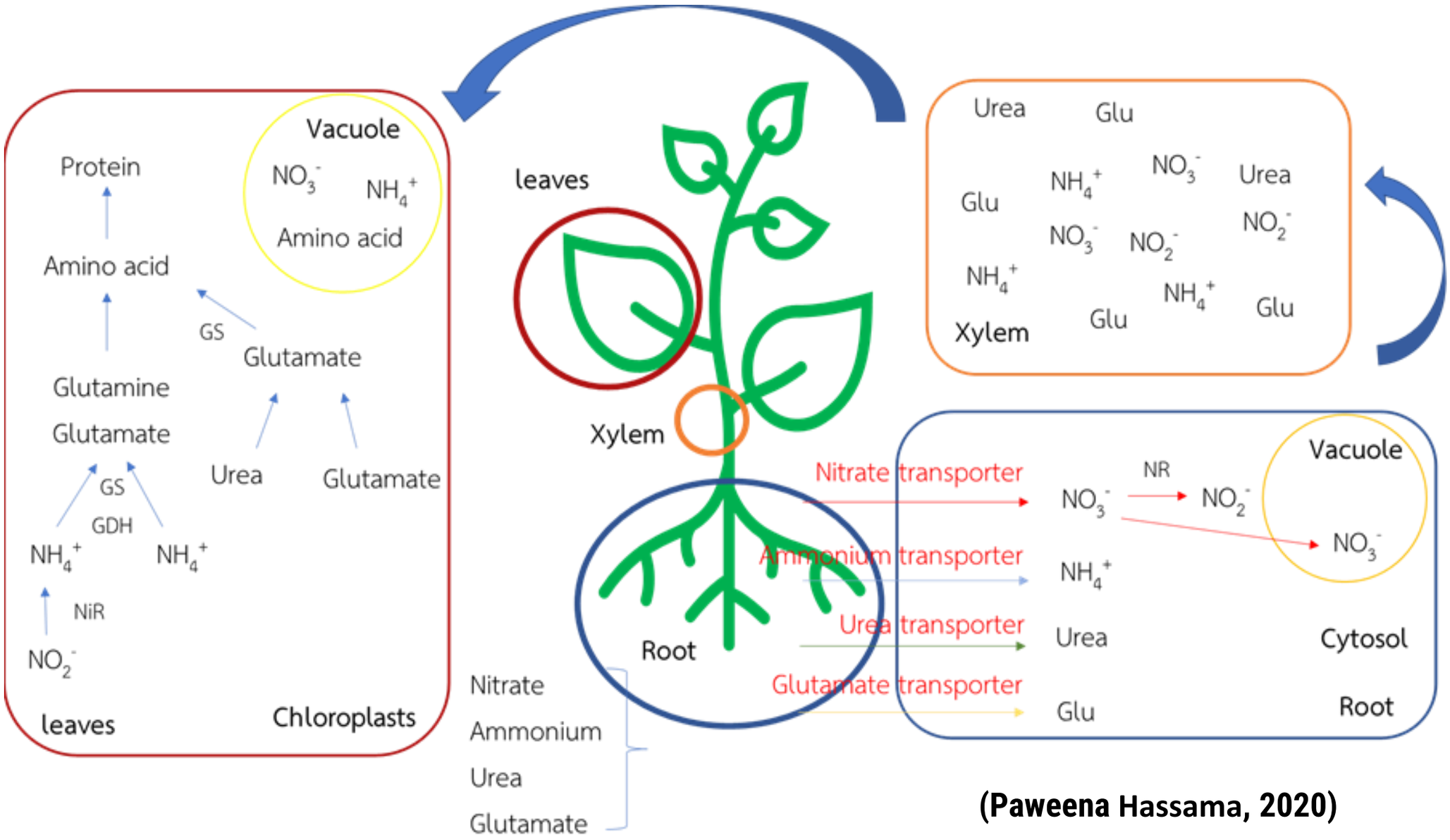
‘+’ represents the presence of the amino acids identified at the wavelength indicated.

‘-’ represents the amino acids not present at the wavelength indicated.

Glutamate treatment revealed the most presence of amino acids including cysteine, phenylalanine, tyrosine and tryptophan.

DISCUSSION

NITROGEN TRANSFORMATION IN PLANT



(Paweena Hassama, 2020)

CONCLUSIONS

1. Nitrate and glutamate treatments were the best sources of nitrogen fertilizer that affected on highest protein contents in mung bean and sunflower microgreens.

2. The parameter of dry weight indicated that the growth of the mung bean and sunflower microgreens in treatments of nitrate, glutamate, urea, and ammonium were higher than the control treatment.

ACKNOWLEDGMENTS

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