

MICROGREENS - A SOURCE OF MICRONUTRIENTS



Edited by

Dr. Veenita Kumari
Dr. M.S. Chaitanya Kumari
Dr. Shirisha Junuthula

Compiled by

N. Pallavi, S.Hari Padmaja Priyank, A. Rupa Sowjanaya
Interns of B.Sc. (Hons.) College of Community Science,
ANGRAU



राष्ट्रीय कृषि विस्तार प्रबंध संस्थान (मैनेज)

(कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार का एक स्वायत्त संगठन)
राजेन्द्रनगर, हैदराबाद - 500 030, तेलंगाना, भारत.

National Institute of Agricultural Extension Management (MANAGE)

(An Autonomous Organization of Ministry of Agriculture & Farmers Welfare, Govt. of India)

Rajendranagar, Hyderabad - 500 030, Telangana, India

&

College of Community Science, Guntur

Acharya N.G Ranga Agricultural University, Andhra Pradesh



ANGRAU

CONTENTS

Sl. No. Name of the Recipe

- 1 Utthappa**
- 2 Pulav**
- 3 Potato tikka**
- 4 Sweet potato tikki**
- 5 Idly**
- 6 Poha**
- 7 Sarvapindi**
- 8 Green's punch**
- 9 Paratha**
- 10 Omelette**



UTTHAPPA

Ingredient Quantities

S

Idly batter	- 500g
Salt	- as per taste
Onion	- 100g
Tomato	- 50g
Chopped	- 250g
Micro greens	
Oil	- 20ml
Green chilies	- 10g



Procedure:

Add salt and water (if needed) to readymade idly batter from the grocery store and mix it well. The batter should be slightly thicker than dosa batter and slightly thinner than the idly batter. Heat non-stick tawa over medium flame. Add few drops of oil on hot tawa and spread it using halved small onion. This process helps spreading of batter and also prevents it from sticking. Repeat this process. When tawa is ready, pour one ladle batter and spread it in round shape by gently rotating the ladle in clockwise or anti-clockwise direction. Make sure that batter spread is slightly thicker than a batter spread for Dosa. Sprinkle finely chopped onion and Micro greens. Sprinkle finely chopped tomato and green chilies over it. Gently press the veggies with a spatula. Drizzle 1-teaspoon oil around the edge. Cook for approx. 2-3 minutes until bottom surface turns light golden brown. If you are making very thick uttapam, cover it with a lid to speed up the cooking process. Flip it gently and cook another side for a minute or until the bottom surface looks cooked. Transfer it to a plate. Repeat the process from step to step and serve.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Protein	Total fat	Dietary fiber	Carbohydrates	Energy kcal
Uthappa WithoutMG (cooked)	36.47	3.23	5.81	4.36	4.28	45.85	253.96
Uthappa with MG (cooked)	35.90	3.80	6.76	4.87	5.52	42.42	250.98
Uthappa batter without (uncooked)	68.59	2.15	4.56	1.12	3.36	18.22	107.55
Uthappa batter with MG(uncooked)	69.56	2.09	5.03	1.06	3.21	19.05	111.92

Uthappa with Microgreens:- Sensory Evaluation

Sample code (187)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	8	8	8	8	8	8	8	8	8	8	8	8	8
Taste	9	9	8	8	8	9	8	9	8	9	9	8	8.5
Texture	9	8	8	8	8	8	7	8	8	8	8	8	7.91
Aroma	9	9	8	9	8	8	8	7	7	8	8	8	8
Overall Acceptability	9	9	8	9	8	8	8	8	6	7	9	8	8.5

Uthappa without Microgreens: Sensory Evaluation

Sample code (781)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	9	9	9	8	9	8	9	9	8	8	9	8	8.50
Taste	8	9	9	8	9	8	8	7	9	7	9	7	8.16
Texture	8	8	9	8	9	8	8	8	9	8	9	8	8.33
Aroma	9	9	8	8	9	8	8	8	9	8	9	8	8.41
Overall Acceptability	8.5	9	8	8	9	8	8	8	9	8	9	8	8.37

Water soluble vitamins composition: Uttappa

Recipe	B2	B3	B5	B6
Uthappa batter with MG (Uncooked)	0.10	0.95	0.39	0.09
Uthappa batter without MG (uncooked)	0.08	0.91	0.32	0.06
Uthappa recipe with MG (cooked)	0.06	0.19	0.36	0.07
Uthappa without MG (cooked)	0.04	0.16	0.34	0.05

PULAV

Ingredients - Quantities

Rice	-	500g
Micro Greens	-	250g
Mirchi	-	30g
Onion	-	100g
Turmeric	-	2 g
Salt	-	25 g
Cashew nuts	-	10g
Almonds	-	10g
Cloves	-	2g
Cinnamon	-	2g
Caraway	-	3g
Oil	-	50g
Ghee	-	50g
Cardamom	-	0.5g
Curd	-	50g
Water	-	1250ml
Bay leaf	-	2g



Procedure: Wash and soak rice for one hour. Take a heavy bottom pot, add little ghee and oil. Add cloves, cinnamon, caraway, cardamom, bay leaf. Add previously fried Cashew nuts and almonds. Add medium sliced onions, slitted green chillies and sauté them until onions turns light golden colour. Add little ginger garlic paste and curd sauté until raw flavour disappears. Add salt to taste and sauté for 2 to 4 minutes. Add sufficient water and stir it well Cover with lid and bring it to boil Drain the water and add rice. Gently mix it and add salt as per your taste and mix it well. Now, add microgreen leaves and dried fenugreek leaves. Cover and cook until water dries by stirring in between.

Proximate Nutrition Composition (g/10g):

Recipe	Moisture	Ash	Protein	Total fat	Dietary fiber	Carbohydrate
Pulav without MG	62.60	1.16	8.22	7.30	3.18	15.54
Pulav with MG	60.63	1.04	9.23	6.21	3.02	19.87

Pulav without microgreens: Sensory Evaluation

Sample code (316)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Appearance	8	8	9	9	7	7	8	8	9	8	8	7	8
Taste	8	8	8	9	7	8	7	7	8	9	9	8	8
Texture	8	7	9	9	7	7	8	7	9	8	8	9	8
Aroma	8	8	8	9	7	8	8	8	9	7	7	7	7.83
Overall Acceptability	9	8	9	9	7	8	8	7	9	8	8	7	8.08

Water soluble vitamins composition: Pulav

Recipe	B2	B3	B5	B6
Pulav with MG	0.10	0.45	0.47	0.08
Pulav without MG	0.08	0.42	0.39	0.06

Pulav with microgreens: Sensory Evaluation

Sample code (231)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Appearance	8	8	8	8	7	8	7	7	9	8	8	7	7.75
Taste	9	7	8	9	7	8	7	8	9	8	8	8	8
Texture	8	7	9	9	7	8	8	8	9	8	7	9	8.08
Aroma	8	7	7	8	7	7	7	8	9	7	7	8	7.5
Overall Acceptability	9	7	8	9	7	8	7	8	9	8	8	8	8.0

POTATO TIKKI

Ingredients	- Quantities
potatoes	- 750g
Salt	- 15g
Water	- As per quantity
Rice flour	- 150g
Green chillies	- 20 g
Chili powder	- 10 g
cumin powder	- 5 g
Ginger garlic paste	- 10g
Chat masala	- 5g
Amchur(Dried mango powder)	- 5g
Micro greens	- 300g
Black salt	- 5g
Oil	- 50ml
Lemon juice	- 10ml



Procedure: Boil the potatoes with salt for 15 minutes on medium flame Mash the boiled potatoes. Add rice flour. Green chillies, ginger garlic paste, red chilli powder into mashed potatoes Add jeera powder, chat masala, aamchur powder, lemon juice. Add chopped micro greens, black salt and mix the contents properly and knead the dough Prepare small balls from it. In a pan pour oil and shallow fry them until it turns golden brown in colour.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Protein	Total fat	Dietary fiber	Carbohydrate	Energy
Potato tikki without MG (cooked)	42.64	3.78	5.28	5.06	0.45	42.79	238.67
Potato tikki with MG (cooked)	43.75	4.14	6.46	5.42	1.06	40.22	237.40
Potato tikki without MG(uncooked)	75.35	2.36	3.54	2.64	0.89	15.22	100.48
Potato tikki with MG(uncooked)	77.10	2.99	4.05	2.39	0.75	12.36	88.56

Potato tikki without Microgreen: Sensory Evaluation

Sample code(456)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	9	8	8	8	9	8	7	8	8	8	8	7	8
Taste	9	9	9	8	9	8	8	9	8	8	8	8	8.41
Texture	7	9	8	8	8	8	8	9	7	8	8	7	7.91
Aroma	8	9	9	9	8	8	6	9	8	8	8	7	8.08
Overall Acceptability	9	9	8	8	8	8	7	9	8	8	8	7	8.08

Water soluble vitamins composition: Potato tikki recipe -mg/100g

Sample name	B2	B3	B5	B6	Vit C
Potato tikki MG(cooked)	0.09	1.73	ND	ND	8.60
Potato tikki without MG(cooked)	0.06	0.99	ND	ND	7.83
Raw potato tikki with MG(uncooked)	1.02	2.45	ND	ND	10.03
Raw potato tikki without MG(uncooked)	0.81	2.04	ND	ND	9.13

SWEET POTATO TIKKI

Ingredients - Quantities

potatoes	-	750g
Salt	-	15g
Water	-	As per quantity
Rice flour	-	150g
Green chillies	-	20 g
Chili powder	-	10 g
cumin powder	-	5 g
Ginger garlic	-	10g
paste		
Chat masala	-	5g
Amchur(Dried	-	5g
mango powder)		
Micro greens	-	300g
Black salt	-	5g
Oil	-	50ml
Lemon juice	-	10ml



Procedure: Boil the potatoes with salt for 15 minutes on medium flame Mash the boiled potatoes. Add rice flour. Green chillies, ginger garlic paste, red chilli powder into mashed potatoes Add jeera powder, chat masala, aamchur powder, lemon juice. Add chopped micro greens, black salt and mix the contents properly and knead the dough Prepare small balls from it. In a pan pour oil and shallow fry them until it turns golden brown in colour.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Prot ein	Total fat	Dietary fiber	Carbohydra te	Energy
Sweet potato tikki with MG (uncooked)	57.66	7.98	4.21	0.52	4.96	24.62	129.37
Sweet potato tikki without MG (cooked)	45.42	3.58	5.62	6.86	5.47	33.00	226.55
Sweet potato tikki without MG(uncooked)	62.77	8.62	3.92	0.59	4.28	19.99	109.03
Sweet potato tikki with MG(cooked)	50.44	3.77	5.98	5.67	5.62	28.48	165.53

Sweet potato tikka with Microgreens: Sensory Evaluation

Sample code(SPT-M)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	7	6	8	8	9	8	9	7	7	7	9	8	7.75
Taste	7	6	8	8	9	8	9	7	8	6	9	7	7.66
Texture	7	6	9	8	9	8	8	7	8	7	9	7	7.75
Aroma	6	6	9	8	9	7	9	7	8	7	9	7	7.66
Overall Acceptability	7	6	9	8	9	8	8	7	8	7	9	7	7.75

Sweet potato tikki without Microgreens: Sensory Evaluation

Sample code(PT)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	7	6	8	7	7	7	7	7	8	8	8	6	7.16
Taste	6	5	7	8	7	7	8	6	7	7	7	6	6.75
Texture	7	6	8	8	7	8	9	7	7	7	8	5	7.25
Aroma	6	5	8	8	7	8	9	7	8	7	7	5	7.083
Overall Acceptability	7	5	7	8	7	7	8	7	7	7	7	6	6.91

Water soluble vitamins composition: Sweet potato recipe -mg/100g

Sample name	B2	B3	B5	B6	Vit C
Sweet potato tikki with MG(cooked)	0.10	0.59	0.85	0.19	16.01
Sweet potato tikki without MG(cooked)	0.08	0.54	0.82	0.17	15.81
Sweet potato tikki with MG(uncooked)	0.13	0.70	0.92	0.23	19.60
Sweet potato tikki without MG(uncooked)	0.11	0.67	0.89	0.21	17.94

MOICROGREENS IDLY

Ingredients

Quantities

Idly batter (Ready to use mix)	-	500g
Micro Greens	-	250g
Oil	-	5 ml
Salt	-	If required as per taste



Procedure:

To the idly batter add previously washed and chopped Micro greens and salt if needed Grease the idly mould with oil. Gently swirl the batter. Into the idly cooker, add 2 to 2.5 cups of water and heat the water. Keep the idly mould in the steamer. Steam for 12 to 15 minutes.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Prot ein	Total fat	Dieta ry fiber	Carbohyd rate	Energ y
Idli without MG(cooked)	60.22	0.54	7.1	1.66	1.02	29.46	163.10
Idli without(uncooked) MG	76.71	0.23	4.8	2.25	1.22	14.82	101.03
Idli with MG (cooked)	61.10	0.74	7.3	2.34	1.50	26.97	160.97
Idli with MG (cooked)	77.70	0.78	7.6	4.43	1.43	7.98	104.89

Water soluble vitamins composition: Idly recipe -mg/100g

Sample name	B2	B3	B5	B6	Vit C
Idli with MG(cooked)	0.30	0.89	0.40	0.11	ND
Idli without MG(cooked)	0.28	0.81	0.36	0.08	ND
Idli with MG(uncooked)	0.39	0.94	0.44	0.12	ND
Idli without MG(uncooked)	0.41	0.92	0.39	0.09	ND

Idly with Microgreens: Sensory Evaluation

Sample code(IWM)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	9	8	7	7	7	8	7	8	7	8	7	8	7.58
Taste	8	7	8	8	7	8	5	8	7	7	7	8	7.33
Texture	7	6	8	7	8	7	6	7	7	7	7	7	7
Aroma	8	9	8	7	7	8	5	8	7	8	7	7	7.41
Overall Acceptability	8	7	7	7	8	8	6	8	7	8	7	8	7.41

Idly without Microgreens: Sensory Evaluation

Sample code(IWOM)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	8	6	6	5	7	7	7	7	7	8	7	7	6.83
Taste	7	6	6	4	6	7	6	7	8	8	7	7	6.58
Texture	8	5	6	5	6	7	5	7	7	7	8	7	6.5
Aroma	8	8	6	5	6	7	6	7	8	7	8	7	6.91
Overall Acceptability	8	6	6	5	6	6	6	7	7	8	8	7	6.66

POHA

Ingredients Quantities

Flattened rice	-	200g
onion	-	100g
Lemon	-	50g
Green chilies	-	20g
Mustard	-	1.5g
Oil	-	30ml
Turmeric	-	1g
Salt	-	10g
Curry leaves	-	3g
Coriander	-	5g
Mint	-	5g
Micro greens	-	100g
Water	-	As per quantity
Cumin	-	1.5g
Chick peas	-	10g
Red chilies	-	3g
Pea nuts	-	30g



Procedure: To a strainer, add flattened rice (poha). Rinse it under running water until it turns soft. To check if it's done, press a flake between your thumb and index finger, it should break easily. Add turmeric and 1/2 teaspoon salt to the poha and toss to combine. Set it aside while you make the tempering in the pan. Heat oil in a pan on medium heat. Once the oil is hot, add the mustard, cumin seeds, and let them pop and add chick peas, red chilies. Then add the chopped onion, Heat oil in a pan on medium heat. Once the oil is hot, add the mustard, cumin seeds, and let them pop and add chick peas, red chilies. Then add the chopped onion, green chili, mint leaves and curry leaves. Cook for 2 minutes until the onions soften. Add the peanuts and sauté for a minute. Then add in the rinsed poha and toss to combine. Taste test some poha and if it feels dry, sprinkle little water all over. Cook for 1-2 minutes. Also tastes test and add more salt as needed at this point. And then cover the pan with a lid and turn heat to low. Let it be like that for 2 minutes. Then turn off the heat. Squeeze in some fresh lemon juice. Garnish poha with more microgreens and coriander and serve.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Protein	Total fat	Dietary fiber	Carbohydrates	Energy Kcal
Poha without MG	52	4.50	3.9	5.06	3.8	30.72	191.20
Poha with MG	54.80	4.22	4.10	5.67	3.9	27.27	183.88

Sample code(IWOM)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	9	9	8	8	8	9	8	8	8	8	9	8	8.33
Taste	8	9	9	8	8	8	7	9	9	8	9	8	8.33
Texture	7	9	8	8	8	8	7	9	8	8	9	8	8.08
Aroma	8	9	8	8	7	8	7	9	9	8	9	8	8.16
Overall Acceptability	9	9	8	8	8	8	7	9	9	8	9	8	8.33

Poha with Microgreens:

Poha without Microgreens: Sensory Evaluation

Water soluble vitamins composition

Sample name	B2	B3	B5	B6	Vit C
Poha with MG(cooked)	0.15	1.26	1.03	0.12	ND
Poha without MG(cooked)	0.10	1.17	0.92	0.11	ND

Sample Code (IWOM)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Sensory attribute													
Appearance	7	9	7	7	8	7	8	8	8	9	8	7	7.75
Taste	8	9	8	7	8	8	8	8	7	9	8	8	8
Texture	7	9	7	7	8	7	7	7	7	8	7	7	7.33
Aroma	9	9	7	7	8	7	7	8	7	8	8	7	7.66
Overall Acceptability	7	9	7	7	8	7	7	8	7	9	8	8	7.66

SARVAPINDI

Ingredients - Quantities

Rice flour	-	500g
Salt	-	15g
Chili powder	-	10g
Groundnuts	-	50g
Chick peas	-	50g
Oil	-	50ml
Micro greens	-	250g
Green chili	-	15g
Ginger garlic paste	-	15g
Curry leaves	-	10g
Sesame seeds	-	20g
Water	-	As per quantity
Onion	-	150g
Cumin seeds	-	3g



Procedure: Soak chick peas and groundnuts for 15 mins. Drain it and put it in a mixing bowl along with chilli powder, sesame seeds, Cumin seeds, onion, green chilli, curry leaves, chopped Microgreens and salt. Add in rice flour and add some ginger garlic paste and water and make into a soft dough. Take a non- stick tawa and drizzle 1 tbsp of oil. Take an orange size dough and press it over the tawa with your hands till it gets even. Using your finger makes small holes in the centre and drizzle some oil in the holes. Now heat a tawa and cover with a lid. Let it cook for 15 -20 min on a slow flame till it is cooked. If you need you can flip over and cook or else remove and serve.

Proximate Nutrition Composition (g/10g)

Recipe	Moisture	Ash	Protein	Total fat	Dietary fiber	Carbohydrate	Energy Kcal
Sarvapindi without MG(cooked)	18.1	3.68	8.8	9.92	5.46	53.74	349.75
Sarvapindi with MG(uncooked)	49.6	1.50	3.52	3.01	2.18	39.89	204.89
Sarvapindi with MG(cooked)	20.67	3.23	9.02	9.78	5.60	51.66	341.32
Sarvapindi without MG(uncooked)	48.47	1.30	3.64	3.32	2.23	40.98	212.57

Sarvapindi without Microgreens

Sample Code (IWOM)	Subjects												
	1	2	3	4	5	6	7	8	9	10	11	12	Average
Appearance	7	6	9	7	8	7	8	7	7	7	8	8	7.41
Taste	7	6	8	8	7	7	7	7	8	8	9	8	7.5
Texture	7	6	8	7	6	6	7	7	8	8	8	8	7.16
Aroma	6	6	9	7	7	7	8	7	7	7	9	8	7.33
Overall Acceptability	7	6	9	7	7	7	8	7	7	8	9	8	7.50

Sarvapindi with Microgreens

Sensory attribute	1	2	3	4	5	6	7	8	9	10	11	12	Average
Appearance	7	7	7	7	9	7	8	8	8	8	8	8	7.66
Taste	7	7	9	8	10	8	8	8	8	8	9	7	8.08
Texture	6	7	8	7	9	7	8	8	9	7	8	7	7.58
Aroma	6	7	9	7	9	7	8	8	8	7	8	8	7.66
Overall Acceptability	7	7	9	7	9	7	8	8	8	7	9	8	7.83

Water soluble vitamins composition

Sample name	B2	B3	B5	B6	Vit C
Sarvapindi with MG(cooked)	0.05	1.68	0.57	0.12	ND
Sarvapindi without MG(cooked)	0.03	1.64	0.52	0.10	ND
Sarvapindi with MG(uncooked)	0.06	1.70	0.60	0.14	ND
Sarvapindi without MG(uncooked)	0.05	1.69	0.57	0.12	ND

PARATHA

Ingredients (per 1 serving)

- Wheat flour –100g
- Microgreens –37.5 g
- Chillies –12.5g
- Ginger –5g
- Ajwain –2.5g
- Aamchur –2g
- Oil – 7.5g
- Salt – 2.5g



Procedure: In a bowl take whole wheat flour. Add salt, oil and water. Mix microgreens, ajwain, aamchur and then knead into a smooth soft dough. Add more water if required while kneading. Cover and keep the dough aside for 30 minutes. Pinch a medium-sized ball from the dough. Flatten and dust with some flour. With a rolling pin, roll into a circle of about 4 inches diameter. Spread some ghee on the dough circle. Fold in a half. Now spread some ghee on this half folded dough. Fold sideways and this time you will get a folded triangle. Dust some flour on the folded triangle. Now begin to roll the folded triangle. Add some flour if required and roll into a circle or triangle of about 6 to 7 inches diameter.

OMELETE

Ingredients (per 1 serving)

- Eggs – 4
- Salt – 2g
- Chili power – 2g
- Onions – 10g
- Green chili – 2g
- Oil – 3ml



Procedure: Whisk the egg mixture vigorously with a fork until the whites and yolks are completely blended. Heat a non-stick pan over medium-high heat. Add enough butter to coat the bottom of the pan. Use unsalted butter; that way, you can control the amount of salt in the omelette. The pan is ready when the foam from the butter subsides. Pour the egg mixture into the hot pan, then let the eggs set a little along the edges it will only take a few seconds. Using a spatula, pull the eggs in from all four sides toward the centre, allowing the liquid egg to flow underneath the set part. When the eggs are set on the outside but not quite in the centre, it's time to add the toppings. Fold one-third of the omelette in with your spatula. The other side will fold over as you tilt it onto the plate. Tilt the skillet to fold the final third of the omelette over, then turn the skillet a little more so the omelette falls onto the plate folded-side down. Season to taste with salt and pepper. Chop microgreens and tap them on the omelette before serving.