



Synergistic effect of irrigation with traditional and technological on growth, and yield attributes of black gram



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DEFINITIONS

- RBD: Randomized Block Design
- RDF: Recommended Dose of Fertilizers
- Technological (in this report) = Kyminasi[®] Crop Booster[™]

HARVEST HARMONICS' SUMMARY

- Location: The experimental field of Lovely Professional Univ. in Phagwara, Punjab, India.
- Scientist: Prof. Rubina Gill.
- Goal of study: To test and measure the effect of Kyminasi[®] Crop Booster[™] (KCB) on the growth parameters and yield of black gram (variety Mash 1038) in Punjab.
- Methodology: Various input combinations as shown in the Layout slides below.
- HIGHLIGHT OF RESULTS: the input combination T2 where Crop Booster irrigation was implemented with 100% RDF, boosted **grain production** per hectare by **+6.5%**, while the **biological weight** was boosted by **+18%**.

Introduction

Black Gram : Vigna mungo L.

- Rich source of **protein, Fiber, vitamins** (B1, B6), and minerals like **iron, magnesium, and potassium**.
- Promotes **heart health**, helps manage **diabetes**, and supports **digestive health**.
- **Health Benefits:**
 - Enhances **energy** and **muscle strength** due to its high protein content.
 - Helps in **blood sugar regulation** and supports **bone health**.
- **Uses:**
 - Commonly used in **dal** (lentil soups), curries, and **fermented foods** like idle and dosa.
 - Used as a soil-enriching crop due to its ability to **fix nitrogen**.
- **Economic Importance:**
 - A key crop for farmers, especially in rainfed agricultural systems.
 - Vital to India's **food security** and **rural livelihoods**.

Table 2. Technical programme of Black Gram

Design	RBD
No. pf treatments	6
No. of plots	24
Net plot area	15m ²
Variety	Mash 1038
Spacing	30*15 cm ²
RDF (recommended dose of fertilizers)	20:40:30 kg ha ⁻¹ (N:P:K)
Irrigation method	1. Traditional 2. Technological irrigation with booster device

Table 5. Treatments with technological irrigation details of Black Gram

S.no.	Treatments
T1	Absolute
T2	100% RDF (through inorganic)
T3	50% RDF + 50% NPK
T4	50% RDF + VAM
T5	50% RDF + Rhizobium
T6	50% RDF + Sulphur

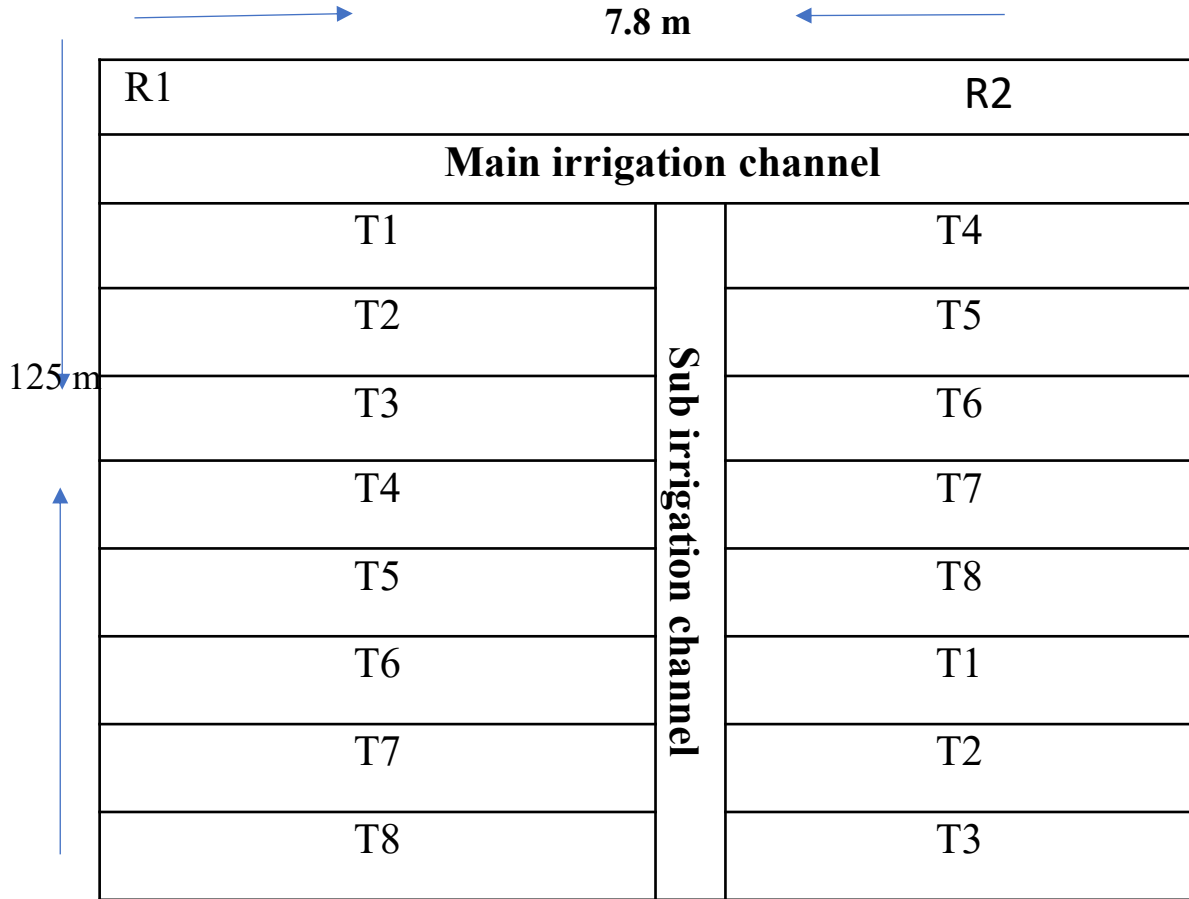
Table 6. Treatments with traditional irrigation details of Black Gram

S.no.	Treatments
T1	Absolute
T2	100% RDF (through inorganic)
T3	50% RDF + 50% NPK
T4	50% RDF + VAM
T5	50% RDF + Rhizobium
T6	50% RDF + Sulphur

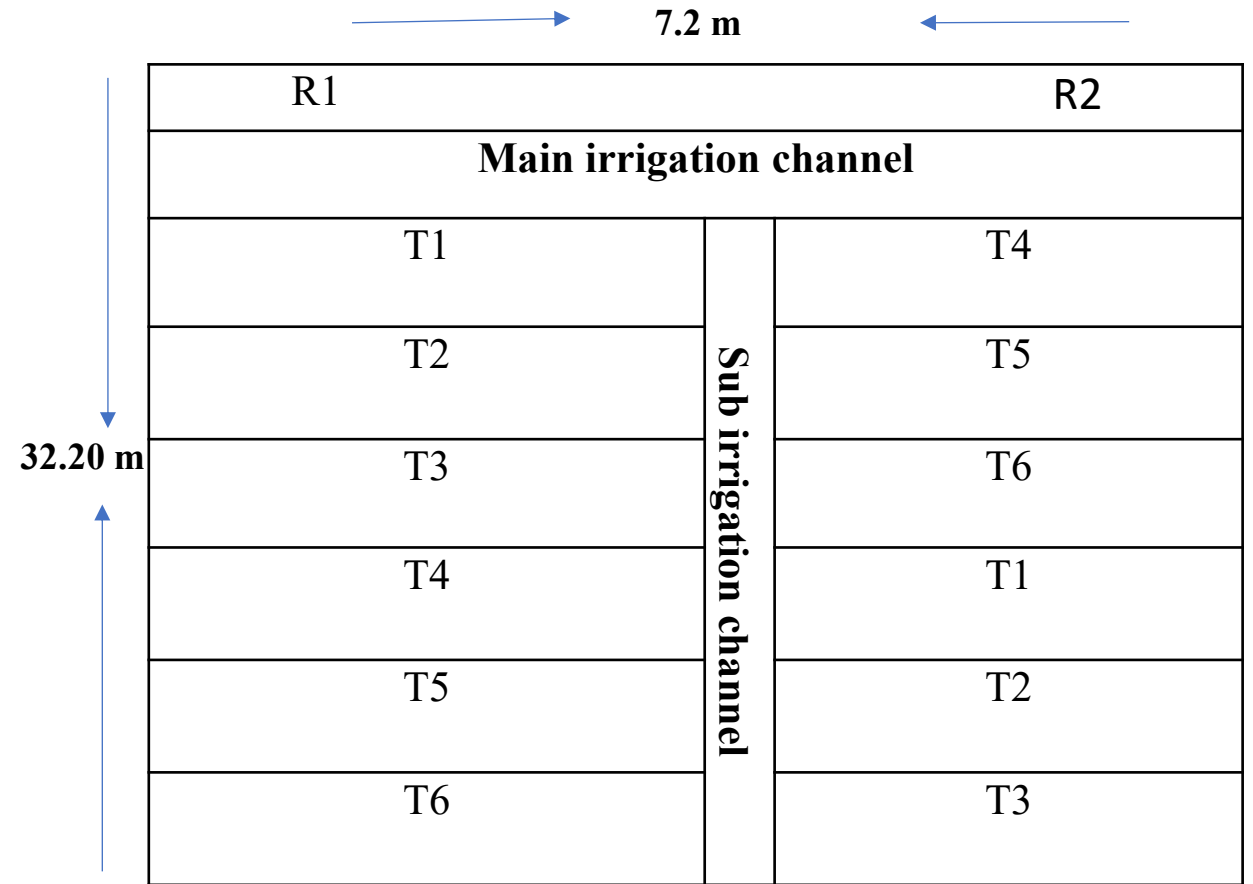
Layout



Black Gram with technological irrigation



Black Gram with traditional irrigation



Observations that were recorded

Black Gram

Growth attributes

- Plant height (cm)
- Fresh weight (g)
- Dry weight (g)
- No. of branches

Yield attributes

- No. of pod per plant
- Test weight (g)
- Grain yield (kg ha^{-1})
- Straw yield (kg ha^{-1})
- Biological yield (kg ha^{-1})

Harvest index (%)

**Findings on Black Gram
with different irrigation
methods and treatments
combination**

Table 14. Effect of irrigation methods on plant height (cm) Black Gram

Treatments combination	Plant height (cm) with technological Irrigation			Plant height (cm) with traditional irrigation		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
Absolute	19.17	35.78	39.77	16.16	32.69	33.44
100% RDF	24.66	44.49	48.49	19.49	37.66	38.83
50% RDF + 50% NPK	22.66	41.83	44.49	18.99	35.61	36.99
50% RDF + VAM	22.83	41.08	43.66	16.99	34.99	35.16
50% RDF + Rhizobium	24.16	42.16	44.9	16.49	34.99	36.06
50% RDF + Sulphur	23.17	39.99	43.49	18.99	34.83	35.66

Table 15. Effect of irrigation methods on no. of branches of Black Gram

Treatments combination	No. of branches with technological Irrigation			No. of branches with traditional irrigation		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
Absolute	2.13	10.49	10.495	1.99	8	9.29
100% RDF	5.83	12.66	14.16	4.17	8.99	11.16
50% RDF + 50% NPK	3.83	12.16	13.08	2.99	9.49	10.665
50% RDF + VAM	3.99	11.66	12.13	3.34	8.66	9.165
50% RDF + Rhizobium	4.33	11.83	12.05	3.33	8.33	10.305
50% RDF + Sulphur	4.34	11.49	12.31	3.83	9	11.535

Table 16. Effect of irrigation methods on fresh weight (g) of Black Gram

Treatments combination	Fresh weight (g) with technological Irrigation			Fresh weight (g) with traditional irrigation		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
Absolute	2.79	11.41	22.145	2.14	10.91	20.64
100% RDF	7.25	18.38	28.5	5.25	16.13	24.545
50% RDF + 50% NPK	4.20	17.88	26.17	3.10	16.46	23.045
50% RDF + VAM	4.21	14.02	25.01	3.15	12.44	24.8
50% RDF + Rhizobium	4.63	15.63	24.965	3.45	13.61	22.93
50% RDF + Sulphur	4.59	14.77	24.165	3.50	13.395	21.29

Table 17. Effect of irrigation methods on Dry weight (g) of Black Gram

Treatments combination	Dry weight (g) with technological Irrigation			Dry weight (g) with traditional irrigation		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
Absolute	0.69	2.24	5.135	0.56	2.24	4.86
100% RDF	1.25	5.54	11.94	0.82	4.895	8.27
50% RDF + 50% NPK	0.77	4.755	9.035	0.59	3.82	7.75
50% RDF + VAM	0.8	3.44	7.395	0.64	3.285	6.23
50% RDF + Rhizobium	0.85	4.03	6.725	0.63	3.045	6.03
50% RDF + Sulphur	0.92	3.715	6.225	0.65	3.53	5.25

Table 18. Effect of irrigation methods on yield parameters of Black Gram

Treatments combination	Yield parameters with technological irrigation			Yield parameters with traditional irrigation		
	Grain yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)	Grain yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)
Absolute	3.2	12.1	15.3	2.34	11.67	14.01
100% RDF	9.5	16.79	26.04	6.4	15.68	22.08
50% RDF + 50% NPK	7.80	15.46	23.26	5.51	14.82	20.33
50% RDF + VAM	6.23	14.48	20.71	4.78	13.68	18.46
50% RDF + Rhizobium	6.56	15.57	22.13	4.68	14.83	19.51
50% RDF + Sulphur	6.42	15.05	21.92	4.56	14.61	19.17

Table 19. Effect of irrigation methods on yield parameters of Black Gram

Treatments combination	Yield parameters with technological irrigation			Yield parameters with traditional irrigation		
	No. of pods/plant	Test weight of grain (g)	Harvest index (%)	No. of pods/plant	Test weight of grain (g)	Harvest index (%)
Absolute	7.88	28.15	20.91	7.45	27.15	16.72
100% RDF	12.11	32.78	35.52	10.47	30.78	28.97
50% RDF + 50% NPK	11.03	30.24	33.52	9.78	29.24	27.09
50% RDF + VAM	10.22	30.15	30.08	9.45	29.02	25.89
50% RDF + Rhizobium	9.33	31.65	29.63	8.72	29.44	23.98
50% RDF + Sulphur	9.4	31.77	29.38	8.5	29.47	23.78



Tillering stage with technological irrigation



Tillering stage with conventional irrigation



Maturity stage with technological irrigation



Maturity stage with conventional irrigation



Growth of black gram with technological irrigation



Growth of black gram with conventional irrigation



Black gram on flowering stage with technological irrigation



Black gram on flowering stage with conventional irrigation

Conclusions

A research conducted at LPU field to compare the effectiveness of two different irrigation systems: a technology-based irrigation system and a conventional (traditional) irrigation method. The study focused on understanding the impact of these irrigation systems on black gram. The research aimed to identify which irrigation method would be more suitable for optimizing growth and yield under varying conditions.

Black Gram – Kharif Season)

For black gram, six treatment combinations were applied, focusing on growth and yield parameters under both irrigation systems. Among these, T2, (100% RDF) ,emerged as the most effective treatment.

Key Findings for Black Gram:

Higher Yield Performance: T2, (100% RDF) demonstrated a 32% increase in yield compared to the traditional irrigation method. This highlights the efficacy of using the full recommended dose of fertilizers in conjunction with technology-based irrigation.

Improved Plant Growth: Growth parameters such as plant height, number of branches, and biomass were notably better in T2, (100% RDF), emphasizing the potential of technology-enhanced irrigation to optimize black gram growth.

Conclusion

In black gram, the technology-based irrigation system consistently outperformed conventional methods in terms of growth and yield. The superior treatment combination T2 for black gram demonstrate that integrating advanced irrigation with tailored fertilization significantly enhances crop productivity, especially under adverse conditions like delayed sowing or disease-affected environments. The lowest treatment combination was T1 (Absolute control) for black gram demonstration.