6TH MEETING OF THE ASIAN COTTON RESEARCH AND DEVELOPMNET NETWORK
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CONTRIBUTORS

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Author's biography

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Academic qualification	:	BSc. In Agriculture
		M Sc in Agronomy
		Post graduate Diploma in Development Planning
		PhD in Agronomy
Work Experience	:	20 years experience in cotton extension
Specialization	:	System Agronomy
Membership	:	KIB, BSA, WSSB
Major Training	:	Computer literacy, Biosafety and GMO crop, Government administration and finance
Country Visited	:	Egypt, Turkey
Publication	:	3

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RATIONAL

- limited high and medium high land
- cotton are facing high competition with vegetables, flowers and other high value crops
- higher cropping intensity
- cotton-slow growing and long duration
- fit into mungbean based cropping pattern
- important strategy for cotton expansion
- high system productivity, net return and land equivalent ratio

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CDB strategy for cotton expansion

- Drought area
- Hill area
- Saline area
- Char area
- Cotton in Agro-forestry
- Cotton based cropping pattern
- Intercropping

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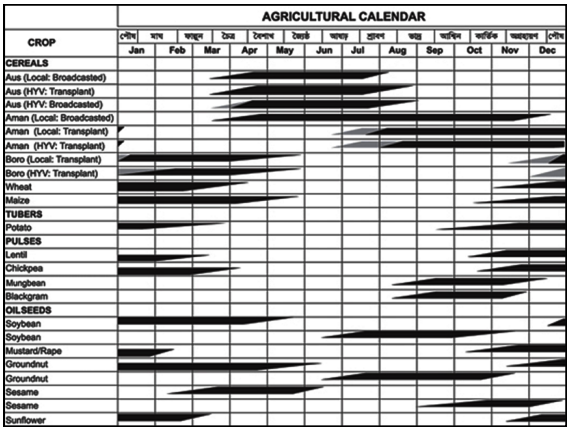
Major crops in Bangladesh

SL.	Crop	Area (ha)	Production (m. tons)
1.	Rice	11358,700	31975,000
2.	Wheat	376,100	901,000
3.	Maize	152,200	887,000
4.	Jute	416,600	924,000
5.	Pulses	233,200	218,000
	Mungbean	23,100	20,000
6.	Oil seeds	365,600	786,000
7.	Sugar cane	117,400	4491,000
8.	Spices	285,800	1350,000
9.	Tobaco	38,000	54,000
10.	Cotton	40,000	27,000

Source : Agriculture Statistics Wing, BBS



Land Type	Cropping Pattern
High land	1. Boro - T. Aman - Fallow
	2. Potato - Boro (HYV) - T.Aman
	3. Pulses - Jute - Fallow
	4. Wheat - Kaon - T. Aman
	5. Tomato - Aus - Vegetables
Medium high land	1. Potato - Boro - T. Aman
	2. Wheat - T. Aman - Pulses
	3. Oilseed - Boro - T. Aman
	4. Boro - T. Aman - Mustard
	5. Tomato - Aus - Vegetable

Source: FAO, Bangladesh

Cotton based cropping pattern

1. Cotton- Sweet gourd
2. Cotton-Winter vegetables
3. Cotton-Maize-Sunhemp
4. Cotton-Mungbean
5. Cotton-Jute/Mesta
6. Cotton-Wheat
7. Cotton-Sesame
8. Cotton-Chilli
9. Cotton-Groundnut
10. Cotton-Water melon
11. Cotton -Potato

Source: CDB, Bangladesh

Mungbean based cropping pattern

Southern and South-Western region

- T. aman rice – mungbean – Fallow
- Aus rice – T. Aman rice – mungbean

-(Haque *et al*. 2004)

Central region

- Aus rice/jute-mungbean-fallow

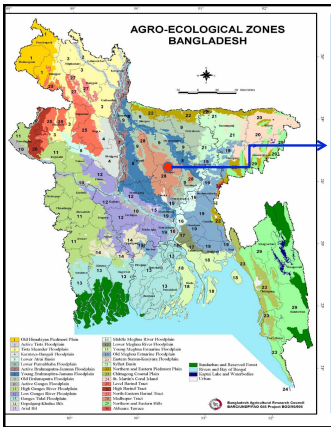
Northern region

- Aus rice-mungbean-rabi

-(Rahman *et al*. 2000)

Existing cotton based inter and relay cropping systems in Bangladesh

- Vegetables- red amaranth, danta, radish
- Pulses- mungbean, black gram
- Oil seeds- Sesame
- Spices- coriander as leaf, ginger, turmeric
- Cotton-rice intercropping in hilly areas
- Cotton-wheat relay cropping
- Cotton-chili relay cropping
- Cotton-aus rice relay cropping
- Cotton-sugarcane relay cropping



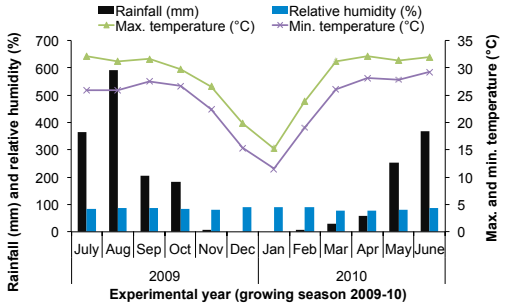
Soil properties of the experimental site

PH	:	6.1
Organic matter (%)	:	0.81
Total N (%)	:	0.04
Available P (ppm)	:	11.6
Exchangeable K (meq/100g soil)	:	0.22
Texture	:	Clay Loam
Classification	:	

Shallow Red-Brown Terrace

with deeper clay horizons

Agro-meteorological feature



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OBJECTIVES

- to find out suitable planting pattern both spatial and temporal for cotton+mungbean intercropping system in order to achieve maximum productivity and economic return
- to determine the optimum population of mungbean as a companion crop with the main crop cotton under cotton+mungbean intercropping system.

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EXPERIMENTAL VARIABLES AND CROP MANAGEMENT

Variety	**: Cotton- CB-10 and Mungbean- BU mung-4**
Design of Experiment	**: Randomized Complete Block Design**
Replication	**: Three**
Unit Plot size	**: 5.4 m × 4.5 m**
Fertilization	**: CDB recommendation fertilizer for cotton BARI recommendation fertilizer for mungbean**
Final thinning	**: Cotton at two true leaf stage Mungbean at first trifoliate stage**
Weeding	**: Two times**
Irrigation	**: Light irrigation**
Insect management	**: Eight times insecticide spray and two hand picking of bollworm**
Crop harvested	**: Cotton: 150 DAS, 165 DAS and 180 DAS Mungbean: 55 DAS and 65 DAS**

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Treatments

T_1=Sole single row cotton
T_2= Sole paired row cotton
T_3= Sole mungbean
T_4= Single row cotton+1-row mungbean
T_5= Single row cotton+2-row mungbean
T_6= Single row cotton+3-row mungbean
T_7= Single row cotton+4-row mungbean
T_8= Paired row cotton+4-row mungbean
T_9= Paired row cotton+5-row mungbean
T_{10}= Paired row cotton+6-row mungbean
T_{11}= Paired row cotton+7-row mungbean

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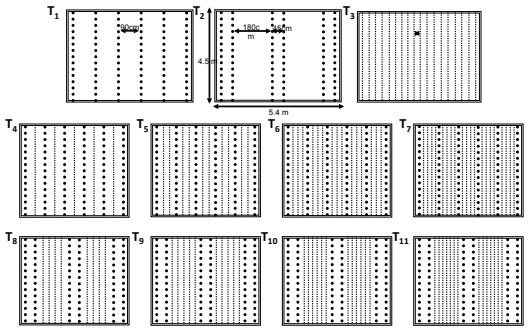

Fig. 1.1. Sketch of the spatial arrangements

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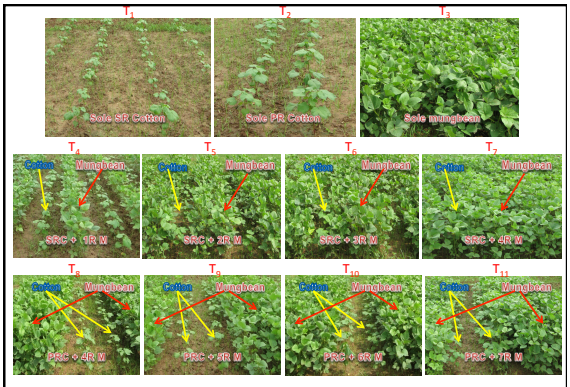

Pic.1.1. Picture showing different spatial arrangements

Data recorded

- Yield and yield components of cotton and mungbean
- Gin properties and lint quality of cotton

I. PRODUCTIVITY AND ECONOMICS

- Intercrop productivity - LER, MAI, Equivalent yield
- Economic evaluation - TVC, GR, NR, BCR
- Competition - RCC, CR

II. GROWTH PATTERN

- Growth data- Plant height, CGR & LAI of cotton and mungbean
- Light availability - LTR

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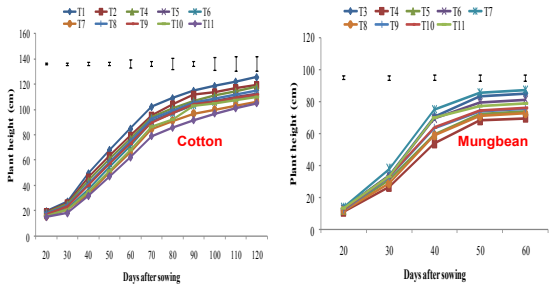

Fig.1.2 and Fig.1.3. Plant height in cotton and mungbean

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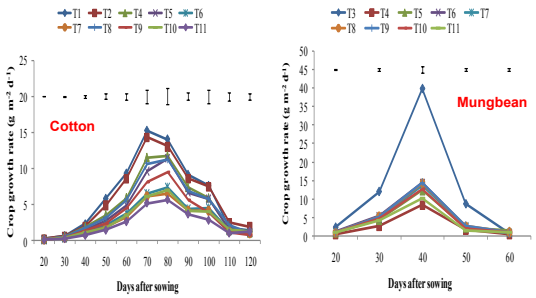

Fig.1.4. and Fig.1.5. Crop growth rate in cotton and mungbean

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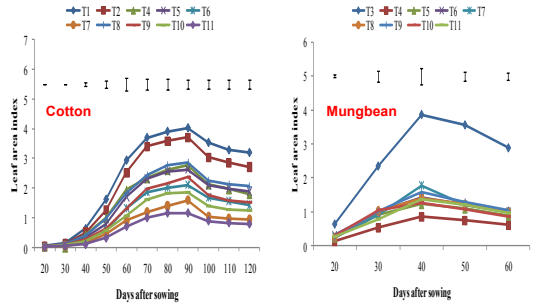

Fig.1.6. and Fig.1.7. Leaf area index in cotton and mungbean

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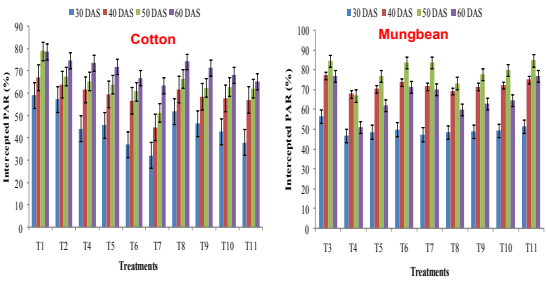

Fig.1.8. and Fig.1.9. **Intercepted PAR in cotton and mungbean** canopy

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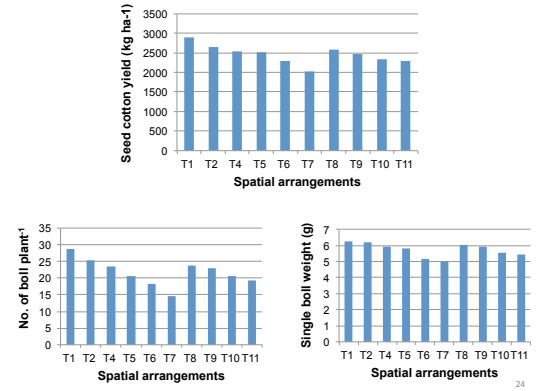

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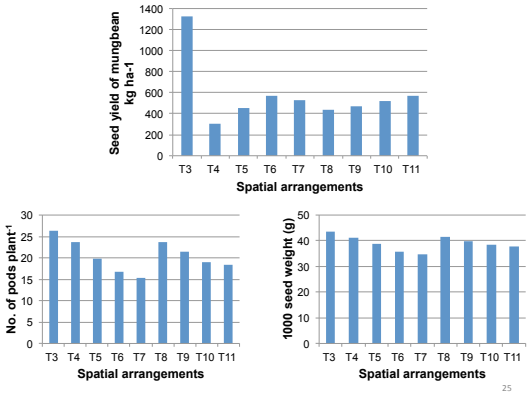

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Fibre quality of cotton

Treatment	Fibre length (cm)	Fibre strength (PSI)	Micronaire value
T_1	2.81	84.92	4.533
T_2	2.80	84.60	4.433
T_4	2.72	83.69	4.400
T_5	2.66	83.09	4.400
T_6	2.62	82.78	4.100
T_7	2.60	82.73	4.067
T_8	2.73	84.23	4.433
T_9	2.70	83.50	4.400
T_{10}	2.65	82.92	4.367
T_{11}	2.64	82.87	4.267
$LSD_{(0.05)}$	0.15	1.86	0.31

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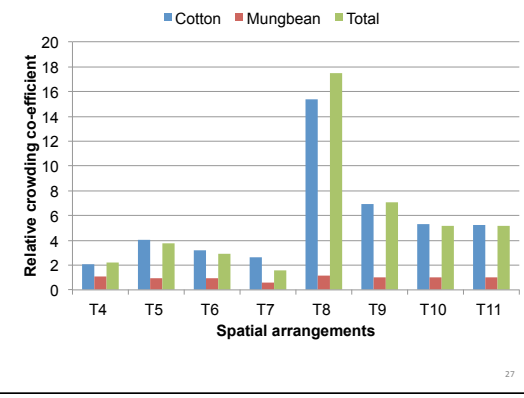

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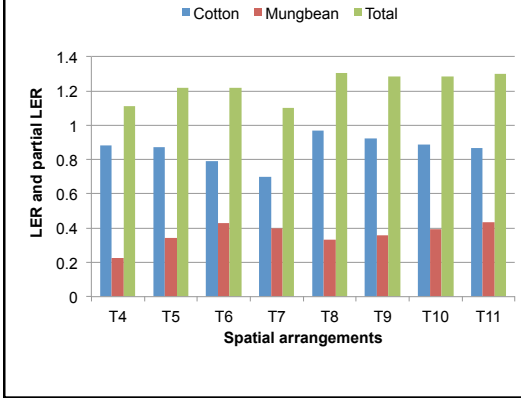

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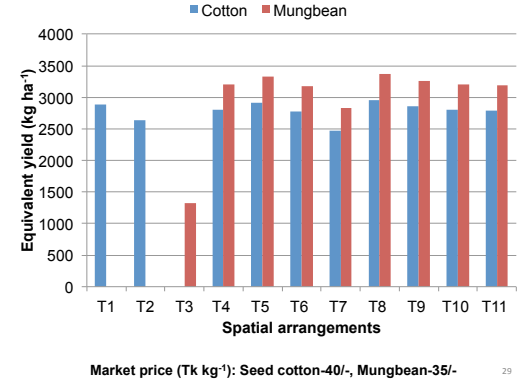

Market price (Tk kg^{-1}): Seed cotton-40/-, Mungbean-35/-

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Gross return, gross margin and benefit cost ratio (BCR)

Treatment	Gross return Tk ha^{-1}	Gross margin Tk ha^{-1}	BCR
T_1	115407	55570	1.93
T_2	105576	48190	1.84
T_3	46258	20150	1.77
T_4	112277	52440	1.87
T_5	116655	56290	1.93
T_6	111022	50180	1.82
T_7	88270	26930	1.44
T_8	118039	60220	2.04
T_9	114269	55880	1.96
T_{10}	111889	53330	1.90
T_{11}	111652	52900	1.90
SE (±)	5276.48	5240.22	0.095
$LSD_{(0.05)}$	11010	10930	0.1942

Market price (Tk kg^{-1}): Seed cotton-40/-, Mungbean-35/-

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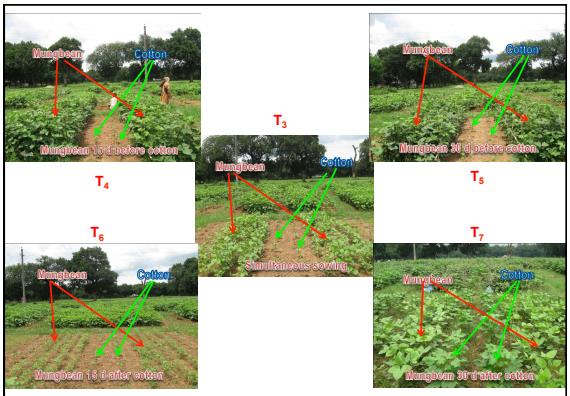
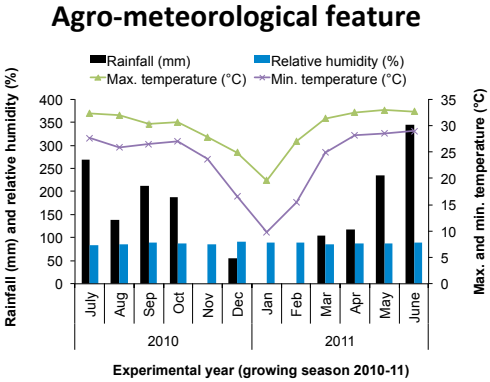


Pic. 2.1. Picture showing temporal arrangements



TREATMENTS

T_1= Sole cotton

T_2= Sole mungbean

T_3= Cotton+mungbean simultaneous sowing

T_4= Mungbean sown 15 days before cotton

T_5= Mungbean sown 30 days before cotton

T_6= Mungbean sown 15 days after cotton

T_7= Mungbean sown 30 days after cotton

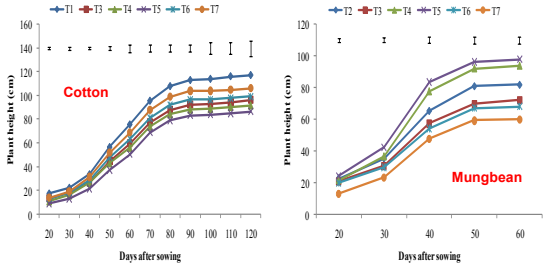


Fig.2.2 and Fig.2.3. Plant height in cotton and mungbean

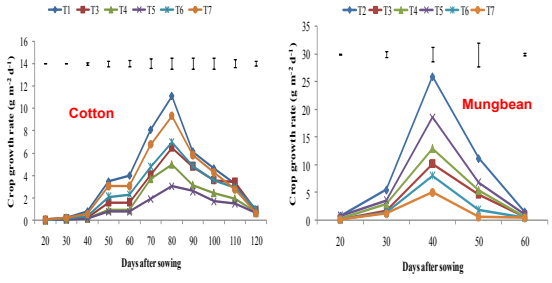


Fig.2.4 and Fig.2.5. Crop growth rate in cotton and mungbean

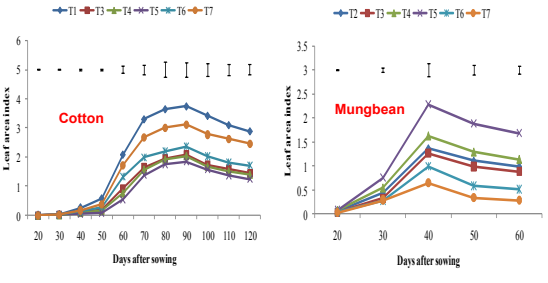
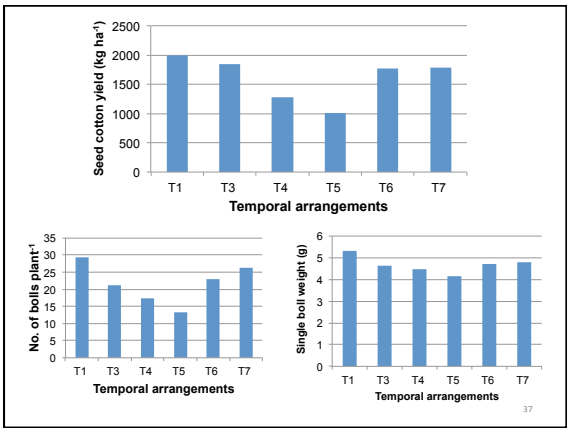
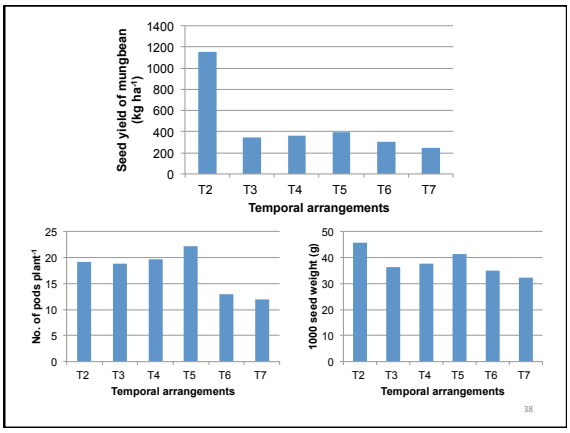


Fig.2.6 and Fig.2.7. Leaf Area Index in cotton and mungbean





Fibre quality of cotton

Treatment	Fibre length (cm)	Fibre strength (PSI)	Micronaire value
T_1	2.95	85.37	3.90
T_3	2.75	82.29	4.13
T_4	2.58	81.73	4.27
T_5	2.57	81.24	4.37
T_6	2.74	83.16	4.13
T_7	2.92	84.00	3.97
$LSD_{(0.05)}$	0.16	NS	NS

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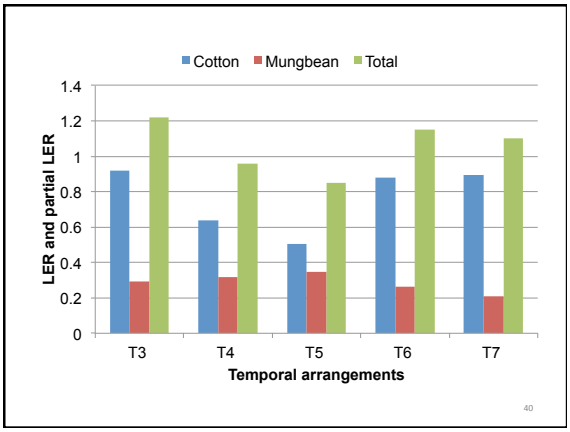

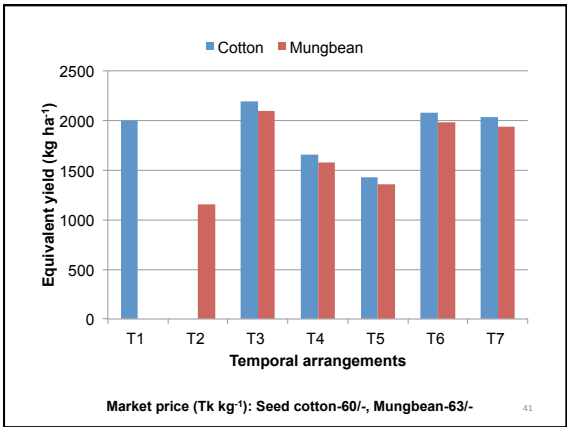

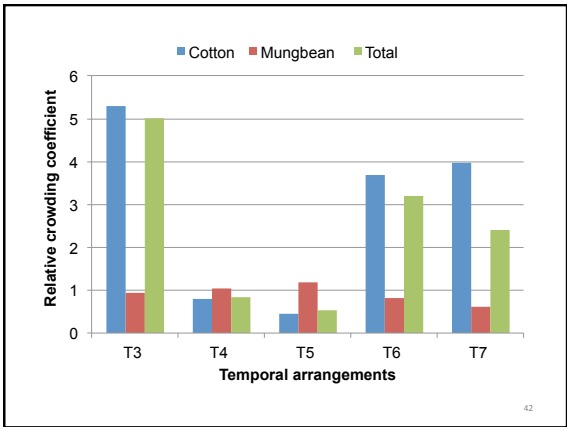

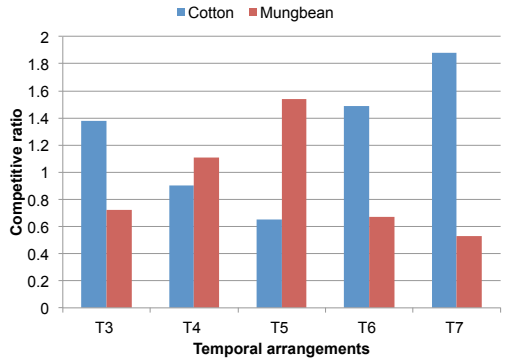

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Gross return, Gross margin and benefit cost ratio (BCR)

Treatment	Gross return Tk ha^{-1}	Gross margin Tk ha^{-1}	BCR
T_1	120049	60790	2.03
T_2	72765	43570	2.49
T_3	131965	71830	2.19
T_4	99726	38080	1.61
T_5	85539	23930	1.39
T_6	124877	64670	2.07
T_7	122463	61860	2.02

Market price (Tk kg^{-1}): Seed cotton-60/-, Mungbean-63/-

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CONCLUSION

- Yield of cotton and mungbean was the highest in sole cropping but their equivalent yield was the maximum under intercropping.
- The highest productivity and economic return obtained from paired row cotton+4-row mungbean with symultaneous sowing indicated the most efficient pattern, which had definite yield advantage over sole cropping.
- Intercropping reduced the growth of both cotton and mungbean but increased mungbean plant height

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