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All India Coordinated Research Project on Floriculture

RAU, Pusa Centre

ANNUAL REPORT
2015 – 16

Deptt. of Horticulture
Rajendra Agricultural University, Bihar

Pusa - 848 125 (Samastipur)

Foreword

This annual report of AICRP (Floriculture) provides a detailed account of research programmes and other activities carried out by RAU, Pusa centre during 2015-16. Four experiments on Marigold,Tuberose and Gladiolus were proposed and it will be conducted this year. The overall progress and achievements of the centre during this year have been quite satisfactory.

I express sincere obligation to my colleagues and co-workers who assisted me during the conduct of the experiments and preparation of this report. I also record my deepest gratitude to the Vice-Chancellor, RAU, Pusa for his kind support and encouragement. Profound thanks are also due to the Director of Research, RAU, Pusa for his support and keen interest in the project. I am extremely grateful to the Dean (Agriculture) and the Controlling Office of this Project for his advice and help. I am also thankful to Dr. H. P. Mishra Professor and Chairman, Deptt. of Horticulture for valuable guidance and moral encouragement. My sincere thanks to Mr. Arun Kumar Mr. B.M.Sinha and Mr. Govind Kumar for his patience and assistance in data analysis and typing the report.

Last but not the least I am greatly indebted to the Director Floriculture Research, Director of Floriculture (ICAR), Pune for his invaluable guidance and support.

RAU, Pusa

Date - 30. 05. 2016

A. K. Singh
P. I., AICRP (Floriculture)
Deptt. of Horticulture

CHECK LIST OF EXPERIMENTS

BACKGROUND INFORMATION:

Nation is striving hard to attain the G.D.P Growth in tune double digit. In which Horticulture is being emerged as the prominent sector .Horticulture has vital scope for earning foreign exchequer and enhancing the rural livelihood including the nutritional s**e**curity. At present the area under total operational holding in our country is 1655 lakh hectare out of which 157 lakh hectare is under Horticulture. It is around 9.5 per cent of the total area. In the Horticulture, Floriculture is considered as an viable diversification enterprise in order to have the maximum net return.

The State of Bihar where 89 per cent farming community are small and marginal farmers where it has tremendous potential in the area of floriculture. The cultivation of commercial flowers like marigold, Tuberose, Chrysanthemum, Rose gerbera and Gladiolus etc. have enormous potential in the State .The main flower growing district of this State are Patna, Nalanda, Muzaffarpur, Samastipur, Vaishali, Begusarai, Purnia, Supaul and Kishanganj . There is enormous potential for growing of commercial flowers in these district But due to lack of awareness and non-availability of suitable technological know how. These areas are isolated and not able to fetch the benefits from the cultivation of commercial flowers .Thus, there is urgent need to disseminate the knowledge related with commercial flower production for wide adoption of the technology in order to enhance the profitability of farm community of this State.

OBJECTIVE:

The major objectives are:

1. To find out the suitable variety for commercial production of marigold, gladiolus and Tuberose in North Bihar Agro-climatic condition.
2. To find out the suitable weedicides effect and Agro- technique for cost effective production of marigold flowers and corms in field condition.

Location & climate:

Experiments assigned to Pusa Centre under AICRP (Floriculture) at Pangabri field Pusa under HI-Tech Horticulture premises. Pusa is situated in Samastipur district of North Bihar at 25.98° N latitude, 85.67° E longitude and 52.0 meters above mean sea level. It is located in the agro-ecological zone No. 1 of the state known as “North-west Alluvial Plains”. It comes under farming situation category IV which is characterized as “non-canal irrigated calcareous soil with moderate rainfall”.

The climate of the experimental site is semi-arid and subtropical, characterized with moderate precipitation, hot and dry summer and cold winter. About 90% of total rainfall of the year is received from South-West monsoon between June and October. The period between December and February receives occasional and light winter showers. April, May and June are the hottest months while December and January are the coldest ones. The daily temperature goes up to a maximum of 42^0C in May-June and a minimum of 6^0C in December-January.

SOIL:

The soil of the research field comes under the great group calcification . It is of recent origin and has developed from the sediments brought down by the Gandak group of rivers. The soil being calcareous contains the free calcium carbonate from 20 to 40 per cent. This has greatly affected the

physical and chemical properties of the soil in the area. The soil of the experimental station was sandy loam in texture, with low organic matter and available N, P_2O_5 and K_2O content.

PHYSICAL AND CHEMICAL PROPERTIES OF SOIL:

Physical and Chemical properties of the soil at the experimental site (a general view)

Properties		Values
A.	**Physical properties**	
1.	Type	Calcareous Sandy-loam
2.	Clay content (%)	-
3.	Bulk density (g/cc)	1.47
4.	Moisture holding capacity (% w/w)	14.22
5.	Moisture at field capacity (% w/w)	21.60
6.	Moisture at PWP (% w/w)	7.38
7.	pH (1 : 2.5)	8.2 - 8.6
8.	Conductivity (dS^{-1})	0.24 - 0.39
B.	**Chemical properties**	
1.	Organic carbon	0.20 - 0.48
2.	Free $CaCO_3$ (%)	28 – 32
3.	Available N (kg/ha)	110 – 180
4.	Available P (kg/ha)	8 – 14
5.	Available K(kg/ha)	110 – 140

STAFF POSITION:

Sanction Positions and names of the incumbents:

No.	Designation	No. of posts	Present position as on 31st March 2014	Name of person holding the post & address
1.	Asstt. Floriculturist	01	Fill up	Dr. Anil Kumar Singh, P.I., AICRP on Flori Deptt. of Horticulture, Faculty of Agriculture Dr Rajendra Prasad Central Agricultural University, Pusa(Samastipur)-848 125, Bihar E.Mail - aksinghfloriculture@gmail.com Mob. No. 09431898889, 07779884600

BUDGET:

Budget allocation and expenditure 2015-16.

Opening balance as on 01.4.2015	Remittance received	Total (1+2)	ICAR share of expenditure during the year	Opening balance as on 31.03.2016 (3-4)
1	2	3	4	5
Rs. 9,41,811.00	Rs. 8,00,000.00	Rs. 17,41,811.00	Rs. 6,62,411.25	Rs. 10,79,399.75

AICRP, FLORICULTURE, PUSA CENTRE
SALIENT ACHIEVEMENTS - 2015 -16

CROP IMPROVEMENT:

Testing of six new genotypes/ strains of gladiolus tested for their performance varied markedly with regard to floral characters, yield, post-harvest, keeping quality (shelf-life). Gladiolus genotype Arka Naveen excelled others with respect to vegetative, floral characters and yield. This strain had markedly better spike and rachis length, number of florets and number of spike per plants than other genotypes. Vase life (keeping quality) for this strain was better than other genotypes. Arka Manorama was the next superior variety with respect to floral characters, yield and keeping quality. The performance of other genotypes was notably poor.

Performance of seven tuberose genotypes including one local was evaluated under north-Bihar agro-ecological situations. The genotype “Bidhan Rajani H-1” differed significantly with respect to days taken to spike emergence, days to opening of first florets, flowering duration, Spike length, rachis length, number of spikes, loose flower yield and other floral characters, bulb or bulb let quality and its performance was better than other genotypes. Prajwal was the next superior genotype with respect to floral and bulb characters. The performance of other genotypes was markedly poor.

Performance of ten marigold variety including two check (Pusa Narangi genda African marigold and Jafri French marigold) was evaluated under north-Bihar agro-ecological situations. The genotype “Pusa Narangi genda and Jafri marigold" both check cultivar African and French marigold differed significantly with respect to vegetative, floral and yield character and its performance was better than other genotypes. Arka Bangara African marigold was the next superior genotype with respect to vegetative, floral and yield characters. The performance of other genotypes was markedly poor.

CROP MANAGEMENT:

Application of weedycides significantly affected the vegetative growth and productivity of marigold flowers under North Bihar agro-climatic conditions. Pre-emergence application of pendimethaline @ 1.0 kg a.i. / ha (T2) followed by hand weeding at 30 and 60 DAP produced the best result and was comparable with the weed free check. Treatment T1 and T3 (Atrazine (Pre emergence)@ 0.75/kg ai/ha and Oxyflurofen (Pre emergence) @ 0.2 kg a.i./ha) respectively followed by hand weeding at 30 and 60 DAP were observed to be next two better treatments.

CROP IMPROVEMENT

Project No. 2.1.1 : Testing of new genotypes of gladiolus.
Duration : 3 years (2015-16 on ward), Crop 1st year
Technical Programme:
Treatments : 06
Treatment details:

T1 - Arka Naveen
T2 - Arka Manorma
T3 - Punjab glad-1
T4 - Glad-Acc- 7
T5 - White Prosperity (Check)
T6 - American Beauty (Check)

Replication : 3 **Treatments** - 6 , **Total treatments** - 54
No. of plant / treatment- 30 , **Design:** RBD
Plot Size: 1.5 m x 1.2 m , **Date of planting:** 20.11.2015
Spacing: 30 X 20 cm

Observation to be recorded:
1. Plant height (cm) 2. Days taken to spike emergence. 3. Days taken to flowering 4. Shape of florets(Open/hooded) 5. Texture and placement of florets 6. Color of florets (As per RHS color chart 7. Spike length (cm) 8. Rachis length (cm) 9. Diameter of second florets (cm) 10. No. of florets remained open at a time 11. No. of florets / spike 12. Vase life (days) 13. No. of spike / plants 14. Reaction to pest and disease % 15. No. of corm / plants 16. Diameter of corm (cm) 17. No. of carmel /plants 18. Fresh weight of carmels /plant(g).

Results:

Six genotypes/ strains tested for their performance varied markedly with regard to floral characters, yield, post-harvest, keeping quality (shelf-life). Gladiolus genotype Arka Naveen excelled others with respect to vegetative, floral characters and yield. This strain had markedly better spike and rachis length, number of florets and number of spike per plants than other genotypes. Vase life (keeping quality) for this strain was better than other genotypes. Arka Manorama was the next superior variety with respect to floral characters, yield and keeping quality. The performance of other genotypes was notably poor.

Table- 2.2.1(1): Floral characters of six genotypes gladiolus bulb.

Treatments		Plant height (cm)	Days taken to spike emergence	Days taken to flowering	Shape of florets(Open/hooded)
T_1	Arka Naveen	102.45	80.50	87.50	open
T_2	Arka Manorma	94.15	77.15	84.81	open
T_3	Punjab glad-1	75.10	73.26	77.35	hooded
T_4	Glad-Acc- 7	80.25	75.10	80.15	open
T5	White Prosperity (Check)	87.50	71.51	82.40	open
T6	American Beauty(Check)	90.15	67.30	73.65	hooded
SE±		5.347	NS	NS	-
CD (5%)		16.847	NS	NS	-
CV		10.492	NS	NS	-

Table- 2.2.1(2): Floral characters of six genotypes gladiolus bulb.

Treatments		Texture and placement of florets	Color of florets (As per RHS color chart	Spike length (cm)	Rachis length (cm)
T_1	Arka Naveen	straight &side by side	violet	65.00	47.00
T_2	Arka Manorma	straight & erect	orange	55.00	38.00
T_3	Punjab glad-1	straight & erect	violet with white line	42.00	30.00
T_4	Glad-Acc- 7	straight & semi erect	yellow	45.00	33.03
T5	White Prosperity (Check)	straight & erect	white	40.00	28.00
T6	American Beauty(Check)	straight & erect	light red	36.00	36.00
SE±		-	-	2.816	2.329
CD (5%)		-	-	8.873	7.340
CV		-	-	10.341	11.418

Table- 2.2.1(3): Floral characters of six genotypes gladiolus bulb.

Treatments		Diameter of second florets (cm)	No. of florets remained open at a time	No. of florets / spike	Vase life (days)
T_1	Arka Naveen	9.00	3.00	17.50	7.20
T_2	Arka Manorma	8.20	2.00	15.70	6.35
T_3	Punjab glad-1	6.70	1.50	12.50	4.50
T_4	Glad-Acc- 7	7.50	2.00	9.65	5.00
T5	White Prosperity (Check)	7.00	2.50	10.50	5.90
T6	American Beauty(Check)	8.00	2.00	11.60	6.00
SE±		NS	0.122	0.789	0.387
CD (5%)		NS	0.384	2.488	1.221
CV		NS	9.754	10.597	11.524

Table- 2.2.1(4): Floral and corm characters of six genotypes gladiolus bulb.

Treatments		No. of spike / plants	Reaction to pest and disease %	No. of corm / plants	Diameter of corm (cm)
T_1	Arka Naveen	2.45	92.50	3.45	5.72
T_2	Arka Manorma	2.15	88.45	3.00	4.95
T_3	Punjab glad-1	1.32	75.15	3.20	3.55
T_4	Glad-Acc- 7	1.62	71.40	2.50	4.55
T5	White Prosperity (Check)	1.55	80.42	1.85	4.00
T6	American Beauty(Check)	2.00	90.15	2.10	4.82
SE±		0.129	NS	0.184	0.337
CD (5%)		0.409	NS	0.580	1.064
CV		12.173	NS	11.897	12.721

Table- 2.2.1(5): Carmel characters of six genotypes gladiolus bulb.

Treatments		No. of carmel /plants	Fresh weight of carmels /plant(g)
T_1	Arka Naveen	18.65	14.55
T_2	Arka Manorma	16.50	10.15
T_3	Punjab glad-1	12.15	11.50
T_4	Glad-Acc- 7	10.20	8.50
T5	White Prosperity (Check)	15.15	9.61
T6	American Beauty(Check)	13.35	12.45
SE±		1.080	0.640
CD (5%)		3.403	2.019
CV		13.052	9.974

Project No. 2.3.1: Testing of new genotypes of tuberose.

Duration : 3 years (2015-16 on ward), Crop – 1st year

Technical Programme:

Treatments : 07

Treatment details:

T1 - Bidhan Rajani H-1
T2 - Bidhan Rajani H-2
T3 - GKT-T-C4
T4 - Prajwal
T5 - Phule Rajani
T6 - Arka Nirantra
T7 - Local Check

Replication : 3 , **Design:** RBD**,** **Total treatments :** 21

Spacing: 30 x 30 cm

Observations to be recorded :

1	Days taken to spike emergence	8	Diameter of florets(cm)
2	Days to opening of first florets	9	Weight of 100 florets(g)
3	Flowering duration (day)	10	No. of spikes / clump
4	Spike length (cm)	11	No. of spikes / ha.
5	Rachis length (cm)	12	Loose flower yield / ha (q / ha)
6	Number of florets/spike	13	No. of bulbs / clump
7	Length of florets(cm)	14	No. of bulb lets / clump

Results:

Performance of seven tuberose genotypes including one local was evaluated under north-Bihar agro-ecological situations. The genotype “Bidhan Rajani H-1” differed significantly with respect to days taken to spike emergence, days to opening of first florets, flowering duration, Spike length, rachis length, number of spikes, loose flower yield and other floral characters, bulb or bulb let quality and its performance was better than other genotypes. Prajwal was the next superior genotype with respect to floral and bulb characters. The performance of other genotypes was markedly poor.

Table -2.3.1: (1): Floral characters of seven tuberose genotypes.

Treatments		Days taken to spike emergence	Days to opening of first florets	Flowering duration (day)	Spike length (cm)	Rachis length (cm)
T_1	Bidhan Rajani H-1	95.40	115.60	24.60	86.50	36.50
T_2	Bidhan Rajani H-2	84.81	104.50	19.60	74.30	23.15
T_3	GKT-T-C4	88.50	108.55	16.50	72.60	21.20
T_4	Prajwal	90.25	110.75	21.39	80.15	32.10
T_5	Phule Rajani	80.85	101.50	18.60	77.70	25.45
T6	Arka Nirantra	82.70	106.20	20.70	76.20	27.30
T7	Local Check	79.15	98.50	12.75	*65.15*	18.65
SE±		NS	NS	1.869	NS	2.097
CD (5%)		NS	NS	5.760	NS	6.464
CV		NS	NS	16.896	NS	13.797

Table -2.3.1: (2): Floral characters of seven tuberose genotypes.

Treatments		Number of florets/spike	Length of florets(cm)	Diameter of florets(cm)	Weight of 100 florets(g)	No. of spikes / clump
T_1	Bidhan Rajani H-1	40.15	7.75	4.10	185.20	10.90
T_2	Bidhan Rajani H-2	28.40	5.95	3.80	130.60	8.20
T_3	GKT-T-C4	30.50	4.90	3.75	145.70	9.50
T_4	Prajwal	36.15	6.60	3.50	176.61	7.50
T_5	Phule Rajani	32.60	5.40	3.10	125.15	10.15
T6	Arka Nirantra	28.20	6.10	3.01	138.85	8.85
T7	Local Check	22.70	3.35	2.75	105.15	5.90
SE±		2.356	0.311	0.143	9.244	0.331
CD (5%)		7.261	0.958	0.440	28.486	1.021
CV		12.491	9.421	7.222	11.160	6.586

Table -2.3.1: (3): Floral characters of seven tuberose genotypes.

Treatments		No. of spikes / ha.	Loose flower yield (q/ha)	No. of bulbs / clump	No. of bulb lets / clump
T_1	Bidhan Rajani H-1	454163.70	337.30	18.70	6.20
T_2	Bidhan Rajani H-2	341664.39	127.20	18.55	4.10
T_3	GKT-T-C4	395829.96	176.20	10.20	4.65
T_4	Prajwal	312497.98	211.20	13.60	5.10
T_5	Phule Rajani	422913.93	172.30	8.70	3.95
T6	Arka Nirantra	368747.60	181.20	11.80	4.00
T7	Local Check	245831.70	58.50	6.50	3.40
SE±		17986.787	12.778	0.841	0.133
CD (5%)		55427.570	39.379	2.592	0.412
CV		8.580	12.258	11.991	5.168

Project No. 2.4.1: Testing of new genotypes of marigold for loose flower.

Duration : 3 years (2015-16 on ward), Crop – 1st year

Technical Programme:

Treatments : 12

Treatment details:

T1 - Bidhan Marigold -1	T7 - IIHR MO-2
T2 - Bidhan Marigold -2	T8 - IIHR MO - 4
T3 - Bidhan Marigold -3	T9 - IIHR Fm - 1
T4 - Arka bangara	T10 - Jafri (F. check)
T5 - Pusa Basanti	T11 - Arka Agni (Not planted)
T6 - Pusa Narangi(A. check)	T12 - Arka Alankara (Not planted)

Replication : 3 , **Design:** RBD**,** **Total treatments :** 36

Spacing: 40 x 40 cm

Observations to be recorded :

1	Plant height (cm)	5	Flowering duration(day)
2	Plant Spread (cm)	6	No. of flowers / plant
3	Days to 50% flowering	7	Diameter of flower(cm)
4	Days to first flower bud appearance	8	Loose flower yield / plot(kg)

Results:

Performance of ten marigold variety including two check (Pusa Narangi African marigold and Jafri French marigold) was evaluated under north-Bihar agro-ecological situations. The genotype “Pusa Narangi marigold and Jafri marigold" both check cultivar African and French marigold differed significantly with respect to vegetative, floral and yield character and its performance was better than other genotypes. Arka Bangara African marigold was the next superior genotype with respect to vegetative, floral and yield characters. The performance of other genotypes was markedly poor.

Note: Cv. Arka Agni and Arka Alankara are supplied by IIHR, Bangalore through currier but plants(rooted cuttings) are not survive. Due to that above mention variety could not be planted in the experiment.

Table- 2.4.1: (1) Vegetative and floral chanters of twelve genotypes of marigold.

Treatments		Plant height (cm)	Plant Spread (cm)	Days to 50% flowering	Days to first flower bud appearance
T_1	Bidhan Marigold -1	45.15	42.15	48.35	40.15
T_2	Bidhan Marigold -2	35.20	40.10	51.15	42.55
T_3	Bidhan Marigold -3	42.45	50.65	55.20	43.55
T_4	Arka bangara	58.98	52.45	58.65	46.45
T_5	Pusa Basanti	61.45	53.65	56.55	45.65
T_6	Pusa Narangi(A. check)	**65.55**	**59.75**	**59.15**	**49.62**
T_7	IIHR MO-2	30.15	27.10	36.55	29.25
T_8	IIHR MO-4	26.35	26.20	38.40	31.10
T_9	IIHR Fm - 1	37.15	35.15	41.50	33.55
T_{10}	Jafri (F. check)	**62.75**	**61.85**	**62.75**	**51.75**
SE±		2.576	2.033	2.426	1.828
CD (5%)		7.655	6.043	7.212	5.433
CV		9.593	7.844	8.272	7.658

Table- 2.4.1: (2) Vegetative and floral chanters of twelve genotypes of marigold.

Treatments		Flowering duration(day)	No. of flowers / plant	Diameter of flower(cm)	Loose flower yield / plot(kg)
T_1	Bidhan Marigold -1	28.50	67.15	4.50	0.35
T_2	Bidhan Marigold -2	33.60	60.55	4.00	0.42
T_3	Bidhan Marigold -3	42.15	77.60	5.50	0.56
T_4	Arka bangara	54.65	92.15	5.58	0.65
T_5	Pusa Basanti	56.15	92.15	6.00	0.62
T_6	Pusa Narangi(A. check)	**58.60**	**95.25**	**6.25**	**0.70**
T_7	IIHR MO-2	35.15	75.15	3.50	0.09
T_8	IIHR MO-4	30.30	65.20	3.30	0.09
T_9	IIHR Fm - 1	31.50	62.15	3.60	0.09
T_{10}	Jafri (F. check)	**65.20**	**105.10**	**5.00**	**0.60**
SE±		1.562	2.438	0.196	0.023
CD (5%)		4.642	7.244	0.584	0.069
CV		6.209	5.329	7.168	9.721

CROP MANAGEMENT

Project No. 3. 5. 1 :- Effect of different herbicides on weed control in marigold.

Duration :- Three year (2014-15 on words), **Crop-** 2nd year

Technical programme :-

Treatments- 8 (Eight) , **No. of replication** - 3
Design -RIBD , **Plot size** -2 m x 2 m
No. of plants/plots -30 , **Spacing** - 40cm x 40 cm
Variety - Pusa Narangi gainda.

Treatment details :-

T1 -Atrazine (Pre em)@ 0.75/kg ai/ha. followed by one hand weeding 30 and 60 DAP.
T2 -Pendimethalin (Pre em) @ 1.0 kg a.i./ha follower by on hand weeding at 30 & 60 DAP.
T3 -Oxyflurofen (Pre em) @ 0.2 kg a.i./ha followed by hand weeding 30 & 60 DAP.
T4 - Isoproturon (Post em) @ 0.75 kg a.i./ha followed by hand weeding 20 & 60 DAP.
T5 - Biopyribac-Na(Post em) @ 25g/ha follower by hand weeding at 20 & 60 DAP.
T6 -3 hand weeding at 30, 60, 90 days after planting.
T7 - Weedy check.
T8 - Weed free check.

Observation recorded :- 1. Weed count/m^2 area at 25 days-interval non-destructive samplings. 2. Fresh weight of weeds (g) at 25 days interval. 3. Dry weight of weeds (g) at 25 days intervals. 4. Plant height at first flower bud (cm) 5. Plant spread N X S and E X W (cm) 6. No. of side shoots/plants. 7. Days to first bud appearance. 8. Days to full bloom stage. 9. Days to flower withering. 10. No. of flower/Plants. 11. Weight of flowers/plants (g) 12. Weight of flower / plot/ha.(Vg)

Results:

Application of weedycides significantly affected the vegetative growth and productivity of marigold flowers under North Bihar agro-climatic conditions. Pre-emergence application of pendimethaline @ 1.0 kg a.i. / ha (T2) followed by hand weeding at 30 and 60 DAP produced the best result and was comparable with the weed free check. Treatment T1 and T3 (Atrazine (Pre emergence)@ 0.75/kg ai/ha and Oxyflurofen (Pre emergence) @ 0.2 kg a.i./ha) respectively followed by hand weeding at 30 and 60 DAP were observed to be next two better treatments.

Table -3.5.1(1): Effect of different herbicides on weed control in marigold.

Treatments	Weed count / m^2 at 25 days interval	Fresh weight (g)	Dry weight (g)	Plant height at first flower bud (cm)	Plant spread N x S and E x W (cm)	No. of side shoots / plant
T1	41.50	51.50	7.35	63.75	65.15	27.60
T2	33.50	39.45	7.15	67.15	92.55	33.15
T3	54.15	44.60	10.95	53.60	62.40	24.50
T4	45.71	50.45	15.10	62.50	46.50	20.20
T5	63.45	62.15	21.40	45.15	62.15	23.15
T6	40.50	71.50	16.16	48.90	56.45	16.75
T7	108.45	175.50	48.75	31.80	29.60	9.55
T8	26.40	31.75	4.50	56.40	68.45	26.20
S.Em (±)	3.560	3.326	0.799	1.645	2.426	0.720
CD (P=0.05)	10.799	10.092	2.426	4.991	7.360	2.184
CV	11.919	8.748	8.436	5.311	6.954	5.509

Table -3.5.1(2): Effect of different herbicides on weed control in marigold.

Treatments	Days to first bud appearance	Days to full bloom stage	Days to flower withering	No. of flower per plant	Weight of flowers / plant (g)	Weight of flowers / plot (g)
T1	51.70	63.15	35.15	48.95	270.50	8.10
T2	48.50	58.30	43.50	66.50	371.20	11.12
T3	62.15	74.40	26.20	59.25	279.50	8.39
T4	49.95	66.15	31.50	48.15	254.33	6.05
T5	63.25	75.25	33.50	36.70	165.55	4.96
T6	55.15	66.50	24.10	56.15	220.20	6.60
T7	66.25	80.60	20.60	22.60	88.15	2.64
T8	44.20	60.25	39.15	56.15	285.70	8.57
S.Em (±)	1.720	2.568	1.033	2.855	22.501	0.341
CD (P=0.05)	5.219	7.791	3.133	8.662	68.259	1.036
CV	5.404	6.534	5.642	10.031	16.112	8.386

METEOROLOGICAL DATA :

Monthly Weather Data of Pusa centre during 2015-16

Month	Max. Temp	Min. Temp.	Relative Humidity		Rainfall (mm)	Evaporation (mm / day)
	^{0}C	^{0}C	7.40 h	14.30 h		
April, 15	33.15	19.97	82.27	42.87	33.2	5.35
May, 15	35.6	23.6	82	47	43.8	5.4
June, 15	36.7	25.6	84.5	51.4	55.4	6.1
July, 15	33.81	25.07	114.32	70.48	149.60	3.94
Aug, 15	33.63	24.40	91.00	68.52	456.80	4.16
Sep, 15	33.7	23.9	89	64	155.8	3.5
Oct, 15	32.07	20.20	89	50	4.2	3.17
Nov, 15	29.3	14.6	89	50	0.0	1.62
Dec, 15	23.3	8.6	86	53	0.0/7.0	1.0
Jan, 16	22.0	8.0	89	57	0.0	1.0
Feb, 16	26.7	17.3	87	52	2.8	2.3
Mar 16	32.6	17.0	82	40	3.8	4.0

LIST OF PUBLICATIONS:

A) Research Publications :

1. A. K. Singh, Udit Kumar and Arun Kumar (2015): Effect of planting date and spacing on performance of Marigold(*Tagetes erecta*) cv - Pusa Narangi under North Bihar Agro-ecological condition. Published in Elixir Agriculture, Elixir International Journal, Poland (79) 30367-30369.

2. A. K. Singh, Udit Kumar and Arun Kumar (2015): Response of Gerbera (Gerbera jamesonii) to different planting times under agro-ecological condition of Bihar. Submitted for publication in Journal of Botanical Science, USA.

B) Programme participation :

1. Participated as resource person in two days farmers training programme Organized by IFFCO, Patna on Protected cultivation of Onion, Garlic production in Bihar at Deptt. of Extension, RAU, Pusa(Samastipur) from dated 25th to 26th May, 2015.

2. Participated as resource person in one day farmers training programme at Kubauli Rampur, Samastipur on dated 19.08.2015.

3. Participated as resource person in Six month Mali Training programme, at T.CA. Dholi, Muzaffarpur from dated 02.10.2015 to 12.11.2015.

4. Participated as resource person in five days farmers training programme at Directorate of Extension, RAU, Pusa (Samastipur) from dated 15.12.2015 to 19.12.2015.

5. Participated as resource person in Kisan Gosthi during Kisan Mela-16 at RAU, Samastipur from dt. 5th to 7th March -2016.

6. Organize Horticulture Show as Secretary during Kisan Mela -16 at RAU, Pusa (Samastipur) from dt. 5th to 7th March-2016.

7. Participated and organized stall of HI- Tech Horticulture in Bihar Diwas Calibration at Gandhi Maidan, Patna from dated 22 - 24th -March, 2016.

C) Extension Publication :

1. A.K.Singh (20115):Poly house main tamater and shimlamirch utapadan. Audhunik Kisan. 44 (3): 6 - 8

2. A.K.Singh (20115): Three fold folder on " Genda ki Vaigynik kheti".

3. A.K.Singh (20116): Kaddu wargeey sabbgion main padap poshak tatwa ka prabandhan. Audhunik Kisan. 45 (1): 28 - 31

Administrative work done :

1. Working as Officer-in-charge, Floriculture and Landscaping unit, Head quarter, R.A.U., Pusa, Samastipur since – 22.07.2006.

2. Working as Officer-in-charge, Plant Nursery (Kitchen Garden), Revolving fund, R.A.U., Pusa, Samastipur since – 22.07.2006.

3. Working as Associated Scientist, NHM, Department of Horticulture ,R.A.U., Pusa, Samastipur since- 08.09.2010.

4. Working as P.I., Operational and management of Hi-Tech Horticulture on commercial flower production under poly house condition at RAU., Pusa, Samastipur since -12.02.2009.

5. P.I., AICRP on Floriculture, Floriculture and Landscaping Unit at RAU. Pusa, Samastipur since – 25.02.2009

6. P.I., Protected cultivation of Vegetables and Flowers in Bihar, under RKVY-06 project at Floriculture and Landscaping Unit, R.A.U., Pusa, Samastipur since- 21.12.2009

Any other:

1. Participated as resource in the National Seminar on Importance of whether forecasting in Agriculture to be held on 8th April-2016 at RAU, Pusa , Samastipur.

2. Participated as Scientist and P.I. AICRP, Floriculture in the XXIV Annual Group Meeting of Floriculture Research of all AICRP centre at SKUAST, Srinagar, Kashmir from dated 17th to 19th April-2015.

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