Plant Archives Vol. 20, Special Issue (AIAAS-2020), 2020 pp. 340-345 ***ISSN 0972- 5210***

EFFECT OF INTEGRATED NUTRIENTS MANAGEMENT WITH PLANT GROWTH RETARDANT ON GROWTH AND YIELD OF AFRICAN MARIGOLD (*TAGETES ERECTA* L.) CV. PUSA NARANGI GAINDA

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Abstract

The present investigation was carried out to study the effect of integrated nutrients management with plant growth retardant on growth and yield of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda at the Horticulture Research Farm, Department of Horticulture, Kulbhaskar Ashram P.G. College, Prayagraj, U.P. during the year 2016-2017, 2017-18 and pooled data of both the year of experiments are taken. The experiment was laid out in a randomized block design with three replications comprising 36 treatment combinations with control. The treatments comprised of Azotobacter, PSB and Vermicompost with fixed dose of plant growth retardant (Cycocel) in all treatments. The results revealed that application of the treatment combination of T_{22} (Azotobacter- 500 ml/ha, PSB- 500 ml/ha and Vermicompost- 2.50 t/ha) recorded maximum growth characters, stem diameter (2.46 cm), number of compound leaves per plant (208.70), number of compound primary branches at 30 day after transplanting (6.30) and duration of flowering (67.50 days) and yield parameters *viz*., number of flowers per plant, fresh weight of flower, fresh weight of flower per plant, fresh weight of flower per plot and flower yield per ha (73.10, 8.42 g, 615.97 g, 9.86 kg and 456.27 q/ha respectively). Whereas treatment T_{32} (Azotobacter- 750 ml/ha, PSB- 500 ml/ha and Vermicompost- 5.00 t/ha) produced significantly maximum plant height (75.23 cm) and primary branches per plant at 90 and 120 DAT (17.90 and 20.30 per plant). The fresh weight of plant (360.30 g) was observed under T_{25} (Azotobacter- 500 ml/ha, PSB- 1000 ml/ha and Vermicompost- 2.50 t/ha) and dry weight of plant (266.90 g) was observed under treatment T_{10}(Azotobacter- 250 ml/ha + Vermicompost- 2.50 t/ha), while maximum primary branches per plant at 60 DAT (12.20) and length of compound leaves (8.92 cm) were recorded under T_{35} (Azotobacter- 750 ml/ha, PSB- 1000 ml/ha and Vermicompost- 5.00 t/ha) but T_{25} (Azotobacter- 500 ml/ha + PSB- 1000 ml/ha + Vermicompost- 2.50 t/ha) showed early flowering (46.00 days).

***Keywords*:** Azotobacter, Biofertilizers, Integrated Nutrients Management, PSB, Pusa Narangi Gainda and Vermicompost.

Introduction

Marigold (*Tagetes* spp. L.) is one of the most popular flowering annual grown for loose flowers, landscape gardening and pot plants. It also offered to worship god, goddess and dried petals use for making rangoli. It is highly suitable as a bedding plants, herbaceous boarder, pot culture, hanging baskets and window boxes. It is known as different name in different region e.g. Friendship flowers in United State, student enablement (student flower) in Germany, dead flower in Latin America and shayapatri in Nepal. Because of its easy cultivation, adoptability to varying soil and climatic conditions, long duration of flowering and excellent keeping quality, marigold gained popularity within no time. The uses of marigold are many fold, often referred to as, "Versatile crop with golden harvest". Marigolds produce thiopenes, which are toxic to nematodes and used as trap crop in tomato, brinjal, tobacco etc (Raghava, 2000).

Marigold a member of family Compositae (*Asteraceae*). The genus *Tagetes* have 33 species (Rydberg, 1945) in which few are important viz., *Tagetes erecta, T. patula ,T. tenuifolia, T. luicida* (sweet scented marigold), *T. sarmetosa* (climbing marigold), *T. lacera*, *T. lemmmoni*, *T. minuta*, *T. filifolia* (Irish lace). It is native to central and South America specially Mexico (Kalpan, 1960). It was distributed in different part of world from Mexico during early 16th century (Yadav *et al*., 2014). In India it was also introduced by Portuguese between 1502-1550 AD.

The marigold is also used as a cover crop. The aromatic oil extracted from *Tagetes minuta* which is being treated as "Tagetes oil" as fly repellent and has also got larvicidal properties, it also being grown as trap crop in agriculture against some of lapidopterans, coleopterans and nematodes. The oil of *T. minuta* was reported to possess bronchoditary, trancholizing, spasmolytic and anti inflammatory properties

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(Chandoke and Ghatok, 1969). A beautiful yellow dye is also extracted to colour the sheep wool. The principle source of pigment in plant is xanthophylls particularly lutein which extracted from petals. The marigold pigment is major source of pigment for poultry industry as a feed additive to intensify the yellow colour of egg and broiler skin of chicken. Apart from poultry industry, marigold dye is also used in textile, pharmaceutical industries, food supplements, cosmetics etc as they offer several advantages over synthetic dyes from natural point of view, safety and eco-friendly in nature (Naik *et al*., 2004).

Materials and Methods

The experiment was conducted at Horticulture Research Farm, Department of Horticulture, Kulbhaskar Ashram P.G. College, Prayagraj (U.P.) during winter season of the year 2016-2017 and 2017-18. The experimental design to be laid out in Randomized Block Design with three replications and 36 treatments, application of a common dose of NPK (120:60:60 kg/ha) as control. Under treatments as biofertilizers four levels of Azotobacter (0,250,500 and750 ml/ha) and three levels of PSB (0, 500 and 1000 ml/ha) was given as seedling treatment. The treatment comprised three levels of Vermicompost (0, 2.50, 5.00 t/ha) will also be supplemented as organic sources of nutrients during field preparation in selected plots. As plant growth retardant, a fixed dose (400 ppm) of cycocel (2-Chloroethyle triemethyle ammonium chloride) was given also as foliar feeding at 30 day after transplanting of seedling in each dose of Azotobacter, PSB and Vermicompost.

The treatments detail is as follows, T_0 (control), T_1 (Vermicompost- 2.50 t/ha), T_2 (Vermicompost- 5.00 t/ha), T_3 (PSB- 500 ml/ha), T_4 (PSB- 500 ml/ha + Vermicompost- 2.50 t/ha), T_5 (PSB- 500 ml/ha + Vermicompost- 5.00 t/ha), T_6 (PSB- 1000 ml/ha), T_7 (PSB- 1000 ml/ha + Vermicompost- 2.50 t/ha), T_8(PSB- 1000 ml/ha + Vermicompost- 5.00 t/ha), T_9 (Azotobacter- 250 ml/ha), T_{10} (Azotobacter- 250 ml/ha + Vermicompost- 2.50 t/ha), T_{11} (Azotobacter- 250 ml/ha + Vermicompost- 5.00 t/ha), T_{12} (Azotobacter- 250 ml/ha + PSB- 500 ml/ha), T_{13} (Azotobacter- 250 ml/ha + PSB- 500 ml/ha + Vermicompost- 2.50 t/ha), T_{14} (Azotobacter- 250 ml/ha + PSB- 500 ml/ha + Vermicompost- 5.00 t/ha), T_{15} (Azotobacter- 250 ml/ha + PSB- 1000 ml/ha), T_{16} (Azotobacter- 250 ml/ha + PSB- 1000 ml/ha + Vermicompost- 2.50 t/ha), T_{17} (Azotobacter- 250 ml/ha + PSB- 1000 ml/ha + Vermicompost- 5.00 t/ha), T_{18} (Azotobacter- 500 ml/ha), T_{19} (Azotobacter- 500 ml/ha + Vermicompost- 2.50 t/ha), T_{20} (Azotobacter- 500 ml/ha + Vermicompost- 5.00 t/ha), T_{21} (Azotobacter- 500 ml/ha + PSB- 500 ml/ha), T_{22} (Azotobacter- 500 ml/ha + PSB- 500 ml/ha + Vermicompost- 2.50 t/ha), T_{23} (Azotobacter- 500 ml/ha + PSB- 500 ml/ha + Vermicompost- 5.00 t/ha), T_{24} (Azotobacter- 500 ml/ha + PSB- 1000 ml/ha), T_{25} (Azotobacter- 500 ml/ha + PSB- 1000 ml/ha + Vermicompost- 2.50 t/ha), T_{26}(Azotobacter- 500 ml/ha + PSB- 1000 ml/ha + Vermicompost- 5.00 t/ha), T_{27}(Azotobacter- 750 ml/ha), T_{28} (Azotobacter- 750 ml/ha + Vermicompost- 2.50 t/ha), T_{29}(Azotobacter- 750 ml/ha + Vermicompost- 5.00 t/ha), T_{30} (Azotobacter- 750 ml/ha + PSB- 500 ml/ha), T_{31} (Azotobacter- 750 ml/ha +PSB- 500 ml/ha + Vermicompost- 2.50 t/ha), T_{32} (Azotobacter- 750 ml/ha + PSB- 500 ml/ha + Vermicompost- 5.00 t/ha), T_{33} (Azotobacter- 750 ml/ha + PSB- 1000 ml/ha), T_{34} (Azotobacter- 750 ml/ha + PSB- 1000 ml/ha + Vermicompost- 5.00 t/ha) and T_{35} (Azotobacter- 750 ml/ha + PSB- 1000 ml/ha + Vermicompost- 5.00 t/ha). Observations on various growth and flowering characters were recorded and obtained results were subjected to statistical analysis for interpretation of data.

Results and Discussion

Growth Character

Height of plant (cm): The data revealed that different nutrient management practices affected various vegetative parameters of marigold sown in Table 1. Significant difference in all the growth parameters was recorded due to application of different combinations of nutrients. The treatment T_{32} (Azotobacter- 750 ml/ha + PSB- 500 ml/ha + Vermicompost- 5.00 t/ha) was recorded the maximum plant height (75.23 cm) which differed significantly from each other as well from other treatments, followed by T_0 (74.03 cm), T_{22} (73.98 cm) and T_{34} (73.36). The minimum plant height was noticed under T_1 (57.92 cm). The enhanced plant height may be due to the availability of more readily formed of nitrogen due to the use of Azotobacter, which might have triggered the vegetative growth of plant. Nitrogen which is a main constituent of chlorophyll, protein and amino acids, plays an important role in cell division, protein synthesis and metabolite transport which further help to build the plant tissues. This is in line with the findings of Gupta *et al.* (1999) and Kumar *et al*. (2013) in marigold (*Tagetes erecta* L.) cv. Pusa Basanti Gainda.

Diameter of stem (cm): The diameter of stem was significantly influenced by various treatments. The maximum diameter of stem was observed under T_{22} (2.46 cm). Whereas the minimum stem diameter was recorded under control (1.36 cm), this stem diameter might be due to the high availability of integrated nutrients data given in Table 1. Similar findings reported by Gotmare *et al.* (2007).

Number of compound primary branches at 30 day interval: Application of different sources augmented on number of compound primary branches per plant at 30, 60, 90 and 120 DAT given in Table 1. Maximum production of compound primary branch was observed under T_{25} (6.30), T_{35} (12.20), T_{32} (17.90) and T_{32} (20.30) at 30, 60, 90 and 120 DAT respectably. Whereas minimum compound primary branches at 30, 60, 90 and 120 DAT was recorded under control. The reason for maximum compound primary branches might be due to availability of major and minor nutrients which enhance the growth and resulting increase in primary branches. Similar findings were showed by Acharya and Dashora (2004), Gotmare *et al.* (2007) and Chandrikapure *et al*. (1999).

Number of compound leaves per plant: The numbers of compound leaves per plant was significantly influenced by different source of nutrient at full bloom stages of growth and presented in Table 1. The maximum numbers of compound leaves per plant were recorded with T_{22} (208.70). The minimum number of compound leaves per plant was recorded with control (158.30). The next treatments T_{32} (206.30), T_{31} (203.00) and T_{35} (202.50) were statistically *at par* with each other. However, the lesser number of leaves had recorded with control (158.30). Similar finding were also reported by Rajaduarai *et al.* (2000), Yadav *et al*. (2004), Syamal *et al.* (2006), Pushkar *et al*. (2008).

Length of compound leaves: The highest length of leaves had been recorded in the treatment T_{35} (8.92 cm) at all the stages of growth. The minimum length of leaves was recorded in T_1 (5.93 cm). Similar findings were showed by Chandrikapure *et al*. (1999).

Fresh and Dry weight of plant: Maximum fresh weight of plant (360.30 g) was observed under T_{25} followed by T_{26} (353.90 g) and T_{22} (350.0 g) and maximum dry weight of plant was reported with T_{23} (106.30 g). Whereas, minimum fresh weight of plant recorded under T_{10} (266.90 g) and dry weight was recorded with T_1 (66.50 g). Obtained findings were accordance with Gotmare *et al.* (2007), Pushkar *et al*. (2008).

Days taken to first flowering: The days taken to first flower flowering was significantly affected by biofertilizers and organic manures and data recorded on this presented in Table 1. The plant treated with T_{25} was showed early flowering (46.00 days). The plant received the treatment T_3 need maximum number of days (68.6 days) taken for first flowering. Similar results have been obtained by Kumar *et al.* (2017), Yadav *et al.* (2018).

Duration of flowering: The findings pertaining on duration of flowering is presented in Table 1 and it is clear that maximum duration of flowering (67.20 days) was noticed in T_{22} followed by T_{32} (66.40 days) and T_{35} (63.80 days) while, control plants produced with minimum duration of flowering (46.00 days). Similar results were reported by Kumar *et al.* (2017).

Yield Character

Number of flower per plant: The result observed on number of flower per plant presented in Table 2. Different sources of bifertilizers and organic manure showed a significant effect on number of flowers per plant. Maximum number of flowers per plant was noticed under the treatment T_{22} (73.10) followed by treatment T_{35} (72.60) and T_{23} (72.50). The minimum number of flowers per plant was recorded under control (52.00). The present findings are similar to the finding of kumar *et al.* (2009) in African marigold (*Tagetes erecta* L.) cv. African Giant Double Orange.

Fresh weight of flower per plant: Significant differences among the treatments were observed with regard to fresh weight of flower per plant presented in Table 2. The treatment T_{22} recorded highest fresh weight of flower per plant (615.97 g) followed by T_{35} (585.22g) and T_{34} (570.14g). The minimum fresh weight of flower per plant was recorded in control (277.04 g).

Fresh weight of flower per plot: Different treatment exhibited significant effect on keeping yield of marigold. Maximum fresh weight of flowers per plot was observed under T_{22} (9.86 kg). The minimum fresh weight of flower per plot was observed under control (4.43 kg). This finding was in agreement with the findings of Radhika *et al*. (2010), Gupta *et al*. (2012) in marigold.

Fresh and Dry weight of flower: The fresh weight and dry weight of flower was influenced by various sources of integrated nutrient management the maximum fresh weight of flower was recorded in T_{22} (8.42 g) and dry weight of flower was recorded under T_{26} (2.08 g) given in Table 2. Whereas minimum fresh weight and dry weight of flower was recorded with control (5.32 g and 0.89 g).

Flower yield (q/ha): Treatments of integrated nutrient management with PGR imparted significant effect on flower yield per hectare (Table 2). The flower yield per hectare ranged from 456.27 Q/ ha to 205.22 Q/ha. The maximum flower yield of 456.27 q/ ha was recorded in T_{22} followed by T_{35} (433.50 q/ha), T_{34} (422.33q/ha), and T_{31} (415.83 q/ha). The minimum flower yield was obtained in the treatment T_0 (205.22 q/ha). Similar findings were showed by Pushkar *et al.* (2008), Pushkar and Rathore (2011), Rao and Reddy (2006), and Abdulsada *et al.* (2013).

Conclusion

On the basis of above results, it is concluded that the use of different level of Azotobacter, PSB and Vermicompost with Plant growth retardant (cycocel@400 ppm) treatment T_{22} (Azotobacter- 500 ml/ha, PSB -500 ml/ha and Vermicompost 2.50 t/ha) realizing better plant growth and production flower yield of African marigold (*Tagetes erecta* L.) cv. 'Pusa Narangi Gainda' under field condition.

Acknowledgement

Authors wish to express our sincere acknowledgment to Dr. M. P. Yadav, Associate Professor and Dean Agriculture Faculty, Department of Horticulture, Janta College, Bakewar, Etawah (U.P.) for her guidance, constant encouragement and useful suggestions during the course of investigation.

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Table 1: Effect of different treatment combinations on growth characters of African marigold

Treatment No.	Treatment Notation	Height of Plant (cm)	Diameter of main stem (cm)	Number of compound primary branches at 30 day interval				Number of compound leaves per plant	Length of compound leaves	Fresh weight of plant (g)	Dry weight of plant	Days taken to first flowering	Duration of flowering
				30DAT	60 DAT	90 DAT	120 DAT						
T_0	$A_0 P_0 V_0$	74.03	1.36	3.50	8.60	11.50	13.55	158.30	6.47	276.20	80.10	66.20	46.00
T_1	$A_0 P_0 V_1$	57.92	1.36	3.80	10.10	11.80	14.50	182.50	5.93	272.40	66.50	62.40	48.40
T_2	$A_0 P_0 V_2$	68.17	1.52	4.00	10.00	14.70	16.90	178.10	6.13	280.20	71.70	55.80	51.50
T_3	$A_0 P_1 V_0$	58.47	1.71	4.90	10.60	12.90	14.90	175.30	6.79	284.10	72.90	68.60	55.10
T_4	$A_0 P_1 V_1$	65.55	1.45	4.70	9.70	15.80	17.90	186.40	6.21	287.30	77.90	67.20	59.10
T_5	$A_0 P_1 V_2$	61.12	1.62	5.30	10.50	13.50	16.40	177.60	6.96	277.80	76.10	54.00	61.10
T_6	$A_0 P_2 V_0$	65.22	1.79	3.80	11.10	15.90	17.70	190.30	6.89	312.50	82.20	59.10	57.30
T_7	$A_0 P_2 V_1$	69.93	1.87	5.50	11.10	17.10	18.30	190.10	6.64	322.20	88.30	55.10	53.10
T_8	$A_0 P_2 V_2$	59.45	1.65	5.20	11.50	15.30	17.80	186.35	7.21	329.40	84.70	53.10	60.90
T_9	$A_1 P_0 V_0$	69.20	1.94	3.30	11.00	14.70	16.20	191.40	6.03	279.70	72.30	60.70	56.00
T_{10}	$A_1 P_0 V_1$	70.05	1.92	4.30	8.50	13.10	14.40	194.70	6.63	266.90	73.70	52.20	62.30
T_{11}	$A_1 P_0 V_2$	71.07	1.51	4.60	10.20	14.10	15.70	197.20	7.15	302.10	81.40	64.40	58.40
T_{12}	$A_1 P_1 V_0$	70.15	1.79	3.90	10.30	15.00	17.20	174.30	7.86	340.10	85.80	50.00	47.80
T_{13}	$A_1 P_1 V_1$	70.05	2.06	5.00	11.00	15.50	17.70	180.10	6.78	320.60	97.40	50.50	48.00
T_{14}	$A_1 P_1 V_2$	72.23	2.03	3.40	9.80	15.20	18.10	181.90	7.78	327.50	87.00	52.60	62.20
T_{15}	$A_1 P_2 V_0$	59.47	1.66	4.70	11.80	15.90	17.20	183.20	7.16	335.70	97.20	49.20	57.70
T_{16}	$A_1 P_2 V_1$	70.56	1.86	5.10	11.30	15.70	17.70	169.90	7.63	327.00	98.30	49.50	64.60
T_{17}	$A_1 P_2 V_2$	68.81	1.87	4.90	10.20	15.20	18.40	189.60	7.91	348.40	92.10	53.90	63.10
T_{18}	$A_2 P_0 V_0$	70.45	1.66	4.70	12.10	16.60	17.90	191.90	7.48	291.80	76.70	58.50	49.90
T_{19}	$A_2 P_0 V_1$	71.26	1.89	5.90	11.60	15.50	17.50	187.90	7.60	284.40	87.20	51.30	62.40
T_{20}	$A_2 P_0 V_2$	70.55	1.58	4.20	10.00	16.10	17.80	199.90	7.10	303.00	85.40	64.60	63.70
T_{21}	$A_2 P_1 V_0$	71.72	1.17	4.50	11.3 0	13.10	15.50	187.30	8.13	332.40	99.30	63.10	50.30
T_{22}	$A_2 P_1 V_1$	73.98	2.46	5.50	12.20	17.00	19.50	208.70	8.49	350.00	102.90	55.70	67.50
T_{23}	$A_2 P_1 V_2$	72.81	2.32	4.20	10.50	16.10	19.00	200.70	8.25	325.40	106.30	65.10	61.10
T_{24}	$A_2 P_2 V_0$	71.97	2.16	5.30	8.90	13.70	15.00	167.10	8.03	346.20	92.10	51.10	47.10
T_{25}	$A_2 P_2 V_1$	72.09	2.34	6.30	11.30	13.20	15.20	189.30	8.05	360.30	94.80	46.00	54.00
T_{26}	$A_2 P_2 V_2$	71.74	2.31	5.50	10.00	15.90	17.10	179.40	8.07	353.90	96.40	52.70	55.10
T_{27}	$A_3 P_0 V_0$	70.31	1.96	4.70	11.10	14.50	17.00	168.10	7.92	285.80	79.80	61.10	48.90
T_{28}	$A_3 P_0 V_1$	72.67	1.95	5.10	11.50	16.50	18.30	184.60	7.29	308.50	83.60	61.90	58.00
T_{29}	$A_3 P_0 V_2$	72.13	1.56	3.50	10.00	16.10	18.00	186.50	7.33	299.50	90.20	62.10	55.00
T_{30}	$A_3 P_1 V_0$	71.93	1.85	3.80	10.70	15.50	17.40	187.60	7.95	343.50	82.60	60.60	61.30
T_{31}	$A_3 P_1 V_1$	73.02	2.22	3.90	9.50	12.60	14.80	203.00	8.86	315.80	100.20	62.40	63.10
T_{32}	$A_3 P_1 V_2$	75.23	2.00	4.90	11.80	17.90	20.30	206.30	8.41	316.80	89.50	64.10	66.40
T_{33}	$A_3 P_2 V_0$	71.65	2.16	3.70	9.70	17.00	18.40	189.60	7.45	336.40	81.90	54.90	54.60
T_{34}	$A_3 P_2 V_1$	73.36	2.31	4.30	10.50	16.60	17.70	195.80	8.09	328.60	93.20	51.60	62.60
T_{35}	$A_3 P_2 V_2$	72.10	2.23	5.90	12.20	16.20	18.40	202.50	8.92	345.20	92.20	54.50	63.80
SE(d)		**1.16**	**0.08**	**0.17**	**0.27**	**0.46**	**0.62**	**3.65**	**0.21**	**5.73**	**2.22**	**1.18**	**1.36**
C.D.(P=0.05)		**2.28**	**0.16**	**0.34**	**0.53**	**0.91**	**1.22**	**7.19**	**0.41**	**11.30**	**4.37**	**2.32**	**2.69**

Table 2: Effect of different treatment combinations on yield characters of African marigold

Treatment No.	Treatment Notations	Number of flower per plant	Fresh weight of flower per plant (g)	Fresh weight of flower per plot (Kg)	Fresh weight of flower (g)	Dry weight of flower (g)	Yield (q/ha)
T_0	$A_0 P_0 V_0$	52.00	277.04	4.43	5.32	0.89	205.22
T_1	$A_0 P_0 V_1$	54.40	319.70	5.11	5.87	0.95	236.81
T_2	$A_0 P_0 V_2$	53.10	317.35	5.08	5.97	0.94	235.07
T_3	$A_0 P_1 V_0$	67.10	406.85	6.51	6.05	1.29	301.38
T_4	$A_0 P_1 V_1$	68.40	436.79	6.99	6.38	1.10	323.54
T_5	$A_0 P_1 V_2$	61.70	394.28	6.31	6.39	1.28	292.07
T_6	$A_0 P_2 V_0$	65.10	365.23	5.84	6.07	1.17	270.54
T_7	$A_0 P_2 V_1$	64.60	409.59	6.55	6.34	1.37	303.39
T_8	$A_0 P_2 V_2$	65.80	387.29	6.20	5.88	1.06	286.89
T_9	$A_1 P_0 V_0$	54.80	363.05	5.81	6.62	1.13	268.92
T_{10}	$A_1 P_0 V_1$	63.00	415.52	6.65	6.59	1.31	308.03
T_{11}	$A_1 P_0 V_2$	54.20	342.85	5.49	6.32	1.11	253.97
T_{12}	$A_1 P_1 V_0$	60.10	433.46	6.93	7.21	1.41	321.09
T_{13}	$A_1 P_1 V_1$	72.50	484.19	7.75	6.65	1.41	358.66
T_{14}	$A_1 P_1 V_2$	68.00	495.05	7.92	7.28	1.68	366.50
T_{15}	$A_1 P_2 V_0$	61.50	460.68	7.37	7.48	1.17	341.25
T_{16}	$A_1 P_2 V_1$	67.10	508.00	8.13	7.57	1.28	376.37
T_{17}	$A_1 P_2 V_2$	71.60	558.15	8.93	7.79	1.63	413.44
T_{18}	$A_2 P_0 V_0$	67.80	453.34	7.25	6.68	1.29	335.81
T_{19}	$A_2 P_0 V_1$	62.20	448.57	7.18	7.21	1.46	332.28
T_{20}	$A_2 P_0 V_2$	71.70	501.69	8.03	6.99	1.32	371.62
T_{21}	$A_2 P_1 V_0$	71.60	529.24	8.47	7.39	1.48	392.04
T_{22}	$A_2 P_1 V_1$	73.10	615.97	9.86	8.42	1.45	456.27
T_{23}	$A_2 P_1 V_2$	72.50	558.20	8.69	7.70	2.02	413.85
T_{24}	$A_2 P_2 V_0$	70.30	529.01	8.46	7.52	1.40	391.86
T_{25}	$A_2 P_2 V_1$	66.70	502.27	8.04	7.53	1.50	372.05
T_{26}	$A_2 P_2 V_2$	61.30	494.16	7.91	8.06	2.08	366.04
T_{27}	$A_3 P_0 V_0$	59.30	438.88	7.02	7.40	1.27	325.10
T_{28}	$A_3 P_0 V_1$	60.80	428.99	6.86	7.05	1.39	317.77
T_{29}	$A_3 P_0 V_2$	70.50	493.59	7.90	6.76	1.15	365.63
T_{30}	$A_3 P_1 V_0$	70.60	522.90	8.37	7.40	1.48	387.34
T_{31}	$A_3 P_1 V_1$	72.20	561.36	8.98	7.77	1.94	415.83
T_{32}	$A_3 P_1 V_2$	66.20	516.88	8.27	7.81	1.47	382.88
T_{33}	$A_3 P_2 V_0$	72.00	535.71	8.57	7.44	1.39	396.82
T_{34}	$A_3 P_2 V_1$	70.20	570.14	9.12	8.12	1.33	422.33
T_{35}	$A_3 P_2 V_2$	72.60	585.22	9.38	8.06	1.57	433.50
SE(d)		**2.01**	**8.78**	**0.31**	**0.24**	**0.06**	**8.64**
C.D.(P=0.05)		**3.95**	**17.30**	**0.61**	**0.47**	**0.12**	**17.02**