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Production potential and economics of floriculture-based crop sequences in irrigated areas of Maharashtra

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ABSTRACT

An experiment was conducted on medium deep soil at Agricultural Research Station, Chas, during 1997–98 to 1999–2000, to find out the most economical floriculture-based cropping systems under irrigated conditions of Ahmednagar district (Maharashtra). Selective crop sequences were evaluated and compared with the established crop sequence groundnut (*Arachis hypogaea* L.)–wheat (*Triticum aestivum* L. emend. Fiori & Paol.) in scarcity zone of Maharashtra. It was observed that out of 8 cropping systems, the chrysanthemum (April planted)–winter season onion (*Allium cepa* L.) and rainy season marigold winter season onion (*rabi*) cropping sequences were found to be the most remunerative and profitable. The monetary returns recorded by these sequences were Rs 134,677 and Rs 124,391/ha and benefit : cost ratio was 5.18 and 5.21 respectively. Per day productivity was the maximum in marigold–onion cropping sequence. Both the sequences showed more land- use efficiency and production efficiency over the others.

Key words : Cropping systems, Floriculture, Gross and net returns, Production potential

The average cropping intensity of Maharashtra is 112% which indicates considerable scope for increasing it, especially in the irrigated areas (Kurlekar *et al.*, 1993). The chrysanthemum, marigold and aster are being commercially cultivated attractive flower crops, which are used as cut flowers or loose flowers. Onion is grown as a vegetable on large scale during the winter season in the region. Besides this, groundnut in rainy season *(kharif)* and wheat in winter season are the most important oilseed and cereal crops grown under irrigated conditions.

Growing of 2 or 3 crops is the need of the hour because of low holding per family due to continuous fragmentation of land, increase in irrigation facilities in Maharashtra. In addition to the need of foodgrains, the demand for flowers and vegetables is also increasing with the increasing population. Hence it was felt necessary to raise floriculture-based cropping sequences having 2 crops in a year and evaluate for

their sustainability and profitability.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Station, Mahatma Phule Krishi Vidyapeeth, Chas, during 1997–98 to 1999–2000. The tretaments consisted of 8 cropping systems, viz. groundnut–wheat (CS_1), chrysanthemum (April planted)–wheat (CS_2), chrysanthemum (April planted)–onion (CS_3), marigold–wheat (CS_4), marigold–onion (CS_5) aster–wheat (CS_6), aster–onion (CS_7), and chrysanthemum (June planted)–groundnut (CS_8). The soil of the site was sandy loam, low in organic carbon (0.48%) and N (100 kg/ha), high in available P (35 kg/ha) and K (830 kg/ha), with pH 8.2. Electrical conductivity of soil extract was 0.17 dS/m. The experiment was conducted in randomized block design with 3 replications. The rainy season (*kharif*) crops were sown or transplanted with the onset of monsoon. The chrysanthemum suckers (CS_2 and CS_3) were planted in April with pre-sowing irrigation. The seedlings of marigold and aster were raised on raised beds in May and transplanted in first fortnight of June. The onion seedlings were raised in October on raised beds for transplanting during winter season. The recommended varieties, seed rate, spacing and fertilizer doses in this area were used for different crops (Table 1).

RESULTS AND DISCUSSION

Crop yield

The April-planted chrysanthemum (CS_3) gave higher yields on pooled mean basis as well as during individual years than that of June-planted chrysanthemum which might be owing to the environmental conditions prevailing during April (Table 2). Among other flower crops, marigold recorded the maximum flower yields next to chrysanthemum in marigold onion (CS_5) cropping sequence on pooled mean basis and during individual years except during 1998–99. Groundnut–wheat was the only sequence other than flower-based sequences which was the established sequence in irrigated areas of the region yielded very less during individual years and on pooled basis. The mean yield of traditional groundnut crop during rainy season was only 1.38 tonnes/ha.

As regards to the winter crops, the onion crop yielded more when grown after marigold, chrysanthemum and aster during individual years and on pooled mean basis. Wheat crop gave higher yield in groundnut–wheat rotation (3.38 tonnes/ha) when compared with the other sequences with wheat. Summer groundnut yields after chrysanthemum, were higher than that of rainy-season yields. Summer groundnut yield was 100.8% higher than that of rainy season groundnut yield on pooled mean basis. The mean total productivity during the year from marigold–onion cropping system was the highest (42.86 tonnes/ha), followed by chrysanthemum–onion (40.44 tonnes/ha) and aster–onion (34.71 tonnes/ha) systems. Productivity per year from groundnut–wheat cropping systems was the lowest (4.76 tonnes/ha) amongst all the systems. Mean productivity per year declined when wheat or groundnut crops were included in flower-based cropping systems during all the years of experimentation.

Economics

The data on main gross monetary returns

Table 1. Seed rate, spacings and fertilizer doses, sowing time and duration for crop sequences

Crop sequence		Variety	Sowing time	Seed rate (kg/ha)	Spacing (cm×cm)	Fertilizers (kg/ha)			Duration (days)
						N_2	P_2O_5	K_2O	
T_1	Groundnut–wheat	'JL 24'	Jun–Sep	100	30 × 10	25	50		97
		'HD 2189'	Nov–Feb	100	Row 22.5	100	50	50	110
T_2	Chrysanthemum–wheat	'Raja'	Apr–Oct	0.111 million root suckers	30 × 30	300	240	200	221
		'HD 2189'	Nov–Feb	100	Row 22.5	100	50	50	110
T_3	Chrysanthemum–onion	'Raja'	Apr–Oct	0.111 million root suckers	30 × 30	300	240	200	221
		'N-2-4-1'	Nov–Mar	10	12.5 × 7.5	100	50	50	118
T_4	Marigold–wheat	'Local'	Jun–Oct	1.5	60 × 30	100	50	50	117
		'HD 2189'	Nov–Feb	100	Row 22.5	100	50	50	110
T_5	Marigold–onion	'Local'	Jun–Oct	1.5	60× 30	100	50	50	117
		'N-2-4-1'	Nov–Mar	10	12.5 × 7.5	100	50	50	118
T_6	Aster–wheat	'Sel-6'	Jun–Sep	1	60 × 60	75	4	25	118
		'HD 2189'	Nov–Feb	100	Row 22.5	100	50	50	110
T_7	Aster–onion	'Sel-6'	Jun–Sep	1	60 × 60	75	40	25	118
		'N-2-4-2	Nov–Mar	10	12.5 × 7.5	100	50	50	118
T_8	Chrysanthemum–groundnut	'Raja'	Jun–Dec	0.111 million root suckers	30 × 30	300	240	200	200
		'SB XI'	Jan–May	10	30 × 30	25	50		120

Table 2. Effect of cropping system on grain, flower and bulb yields of rainy season and winter crops (tonnes/ha) and monetary returns benefit : cost ratio and per day net returns (1997–98 to 1999–2000)

Treatment	Rainy-season yield				Winter season yields				Gross monetary returns (Rs/ha)*	Net monetary returns (Rs/ha)*	Benefit : cost ratio*	Net returns (Rs/day)*
	1997–98	1998–99	1999–2000	Pooled mean	1997–98	1998–99	1999–2000	Pooled means				
Groundnut–wheat	0.92	1.66	1.68	1.38	2.43	3.59	4.10	3.38	48,580	27,437	2.29	133
Chrysanthemum–wheat	10.30	2.27	8.66	7.08	2.36	2.99	3.42	2.92	79,985	56,790	3.45	172
Chysanthemum–onion	10.30	2.84	9.37	7.50	22.79	40.91	35.10	32.94	166,929	134,677	5.18	397
Marigold–wheat	7.00	2.52	10.4	6.94	2.2	3.24	3.18	2.88	65,294	44,822	3.19	197
Marigold–onion	8.00	2.80	10.92	7.24	32.13	39.98	34.73	35.61	153,920	124,391	5.21	529
Aster–wheat	3.98	4.42	6.14	4.84	2.20	3.58	3.77	3.18	48,638	27,986	2.36	123
Aster–onion	4.36	4.30	6.23	4.97	31.45	21.71	3.07	29.74	126,142	96,432	4.25	410
Crysanthemum–groundnut	3.58	3.34	7.59	4.84	2.99	2.55	3.08	2.87	927	69,300	397	217
CD (P=0.05)												

*Mean of 3 years data

revealed that the cropping sequence chrysanthemum–onion (CS_3) and marigold–onion (CS_5) recorded significantly higher gross monetary returns (Table 2). On pooled mean basis, the gross and net returns were Rs 166,929 and Rs 153,920/ha respectively. The gross returns were about 3 times more than that of groundnut–wheat, established cropping systems in this irrigated area. The net returns during the individual years and on pooled mean basis were also higher from these sequences followed by aster–onion.

The chrysanthemum–onion (CS_3) crop sequence registered significantly highest net returns (Rs 134,677/ha), followed by marigold–onion (CS_5) sequence (Rs 124,391/ha) which were significantly superior to those recorded in rest of the cropping sequences and were found at par with each other on pooled mean basis. Among all the flower–based cropping sequences, the marigold–wheat (CS_4) and aster–wheat (CS_6) were found to be at par with that of CS_1 (groundnut–wheat) which was predominant cropping sequence in the area. This indicated that the inclusion of flower and vegetable crops in a cropping system enhanced gross as well as net returns. When wheat or groundnut crop was included in the system along with flower crops, net returns declined considerably. Significantly higher monetary returns under the above said sequences might be owing to the inclusion of flower crops, viz. chrysanthemum, marigold and aster, and high productivity vegetables like onion. Similar trend of high monetary returns by inclusion of cash crops like groundnut, cotton and high productive vegetables like onion and chilli in crop sequences were reported by Maurya and Bagde (1982), Temgire *et al.* (1983), Soni and Kaur (1984) and Bhore *et al.*, (1988) and Kurlekar *et al.* (1993).

On pooled mean basis benefit : cost ratios were maximum from marigold–onion (5.21) and chrysanthemum–onion (5.18) cropping sequence (Table 2). The cropping sequence marigold–onion gave more per.day returns (Rs 529/day), followed by aster–onion (Rs 410/day) and chrysanthemum–onion (Rs 397/day). The per day net returns were based on the duration of both the crops in a year and the net returns obtained from the respectively system. The benefit : cost ratio is the best measure for economic evaluation of the system. Under these circumstances marigold–onion and chrysanthemum–onion would be best recommendation of the floriculture-based cropping system under irrigated conditions in scarcity zone of Maharashtra State.

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