variety of mango for control fruits was 12.3%. The PLW of totapuri variety fruits treated for a longer duration at 46°C and 48°C, the PLW was almost equal to the control fruits where as the PLW for fruits treated for a shorter duration was in the range of 9.5 to 10.4 per cent.

Heat injury

Heat injury to the fruits was observed when the fruits were subjected to longer duration. There was loss up to 10% when the fruits were subjected to 46°C for 90 min. and 48°C for 60 min. and 48°C 80 min. The heat injury was observed when the size of the fruits was very small. The quality of the fruit before treatment also plays a very important role in spoilage of fruit due to heat injury. However no damage to the fruit was observed when the fruits were subjected to shorter duration of treatment at 50°C and 52°C.

Storage behaviour of hot water treated mangoes

Hot water treatment helped in the uniform ripening of mango fruits. Nearly 90 per cent of the fruits treated at 52°C for 10 min and 20 min ripened between 10h and 11h day during storage. More than 80 percent of the fruits treated at temperature of 48°C for 40 min, 50 min and 80 min ripened between 12th and 13th day. The same trend was observed when the fruits were treated at 46°C for 75 min and 90 min. In the fruits treated at 46°C for 65 min., ripening was very slow and the fruits ripened between 16th and 17th day. The control fruits ripened over a period of 17 days and the ripening was not uniform.

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Research Notes

Economics and quality assessment of organically grown tomato

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Organic vegetable cultivation offers one of the most sustainable farming system with long term recurring benefits such as soil health maintenance, stability in production etc. by imparting a better resistance against biotic and abiotic stresses. Renewed efforts are in vogue during the last 10 years in the pursuit of growing organically since tomato is one major vegetable commonly grown in India. So, the present study was undertaken with an objective of exploring the economics and quality of tomato under organic farming besides improving the yield.

A field experiment was conducted with different organic N sources during Dec.1999-Mar. 2000 in red sandy loamy soil of Agricultural College and Research Institute, Killikulam in

Table 1. Effect of different organic N sources on economics of tomato

Treat ments	Yield t ha^{-1}	Quantity applied t ha^{-1}	Cost kg^{-1} of the nutrient source Rs.	Cost of culti- vation Rs.ha^{-1}	Cost of manure (Rs.ha^{-1})	Return (Rs.)		BC ratio
						Gross returns	Net returns	
T_1	16.2	-	-	42000	-	81000	39000	1.9
T_2	26.9	0.326	4.0	43304	1304	134500	91196	3.1
T_3	32.5	7.50	0.5	45750	3750	162500	116750	3.6
T_4	20.8	3.75	0.5	43875	1875	104000	60125	2.4
T_5	47.4	3.61	0.9	45249	3249	237000	191751	5.2
T_6	30.5	1.53	0.9	43377	1377	152500	109123	3.5
T_7	40.2	1.70	4.0	48800	6800	201000	152200	4.1
T_8	28.4	0.85	4.0	45400	3400	142000	96600	3.1
T_9	29.3	10.71	0.25	44677.5	2677.5	146500	101823	3.3
T_{10}	20.4	5.36	0.25	43340	1340	102000	58660	2.4
T_{11}	35.5	4.05	1.00	46050	4050	177500	131450	3.9
T_{12}	23.7	2.03	1.00	44030	2030	118500	74470	2.7

* Data not statistically analyzed

Table 2. Effect of different organic N sources on yield and quality of tomato

Treat ments	Yield t ha^{-1}	Oxalic acid (%)	Nitrate ppm	Moisture (%)	Shelf life days	Juice (%)	Peel (%)	Seed wt g fruit^{-1}
T_1	550	2.2	15	91	5.3	33.2	4.5	1.2
T_2	910	2.9	35	95	3.4	25.3	4.2	0.9
T_3	1100	2.2	22	90	5.2	38.4	5.5	1.3
T_4	840	2.3	20	89	6.5	37.3	5.4	1.2
T_5	1600	1.1	26	88	7.9	40.6	5.3	1.6
T_6	1030	1.2	25	89	6.3	39.5	5.2	1.5
T_7	1360	2.4	26	93	4.2	32.3	4.9	1.3
T_8	960	2.3	24	91	5.5	31.6	5.0	1.2
T_9	990	1.2	15	87	8.3	41.9	6.1	1.7
T_{10}	690	1.3	16	89	7.4	40.4	6.0	1.6
T_{11}	1200	1.2	26	89	6.6	35.5	5.8	1.2
T_{12}	800	1.3	25	90	5.3	34.3	5.7	1.3
SEd	70	0.05	1.1	1.0	0.43	0.51	0.21	0.05
CD (P=0.05)	140	0.11	2.2	2.01	0.86	1.03	0.42	0.11

RBD with three replications. The treatments were T_1 - control (no manure or fertilizer), T_2 - 150 kg N through urea; T_3 - 150 kg N through FYM (7.5 t ha^{-1}); T_4 - 75 kg N through FYM (3.75 t ha^{-1}); T_5 - 150 kg N through poultry manure (3.06 t ha^{-1}); T_6 - 75 kg N through poultry manure (1.53t ha^{-1}); T_7- 150 kg N through fishmeal (1.75 t ha^{-1}); T_8 - 75 kg N through fishmeal (0.856 t ha^{-1}); T_9 -150kg N through pressmud (10.71 t ha^{-1}); T_{10} - 75 kg N through pressmud (5.36 kg ha^{-1}); T_{11} - 150 kg N through pig manure (4.05 t ha^{-1}) and T_{12} - 75 kg N through pig manure (2.03 t ha^{-1}). No inorganic source of fertilizer or chemicals was added in case of organic treatment at any stage of crop growth

Well decomposed organic N sources were brought from near by sources, dried under shade, powdered well, analyzedfor their nutrient contents and required quantities were worked out as per treatment and applied. Half of the N requirement was applied as basal and remaining at 45 days after transplanting. No inorganic fertilizer or synthetic chemicals was added incase of organic treatment.

The soil was low in available N, medium in available P and K (195, 21 and 330 kg N and P_2O_5, K_2O ha^{-1} respectively). Parameters were recorded by standard procedures, analysed statistically and compared for significance at 5 per cent level and presented in Table 1 and 2.

Application of organic N sources increased the net returns and gross returns per hectare. Among the organic N sources, application of 150 kg N as poultry manure recorded the highest net and gross returns (Rs.191751 and 237000 respectively). The lowest net returns was recorded in the control plots. Benefit cost ratio was also high when of 150 kg N was applied as poultry manure may be due to increased yield and decreased cost of cultivation (Table 1).

Oxalic acid concentration was increased due to the application of 160 kg N as urea. Synthesis of oxalic acid will be promoted in the plant if cation and anion balance is disturbed due to heavy application of synthetic fertilizers. A level below three per cent is believed to be safe, above which symptom of oxalate toxicity will be exhibited (Desraj and Mudgal, 1968). In this present study, even though oxalic acid content was within the permissible limits, its accumulation is high indicating the disturbances of cation and an ion balance. Nitrate concentration assumes to be important to the consumer's health point of view. A level more than 50 ppm is considered to be toxic level. Higher concentration of nitrate may cause methanoglobinemia, a syndrome commonly called as "blue baby". In this study application of 150 kg N through urea increased the nitrate concentration upto 35 ppm. This may be due to higher concentration of N with low concentration P and K.

Moisture content is important in tomato because higher moistue may deteriorate the quality (taste) of the fruit. In this study higher moisture was recorded in the frutis from the plots receiving 150 kg N as urea and fishmeal. Lower moisture content was recorded in the plots applied with 150 kg N as poultry manure, which was on par with 75 kg N as poultry manure, FYM and both the levels of pressmud.

The shelf life of tomato fruits was improved due to the application of organic sources. Application of 150 kg N through pressmud recorded the highest shelf life of 8.3 days, which was on par with poultry manure (7.9) while lower shelf life was recorded with 150 kg N as urea and it was on par with fishmeal (Table 2).

Juice per cent was increased due to the application of poultry manure and it was on par with pressmud and 75 kg N through poultry manure. The peel per cent was increased due to the application of 150 and 75 kg N through pressmud. Prabakaran (2000) reported that application of pressmud reduced the number of fruits but increased the weight and pericarp thickness of the tomato fruits. This might be the reason for increased peel percentage in this present study. The peel per cent and juice per cent were increased due to the application of 150 kg N through urea. Seed weight of individual fruit was increased due to the application of 150 kg N through pressmud was on par with poultry manure.

Yield of tomato fruits was increased due to the application of 150 kg N through poultry manure. The lowest yield was recorded in the control plots. Application of organic sources increased the yield and quality. Among the organic N sources, the effect was higher with the application of 150 kg N as poultry manure. The application of poultry manure might have increased the release of macro as well as micronutrients in the soil resulting in the better extraction of nutrients, which inturn increased the drymatter production, plant height, number of branches, nutrient uptake and leading to higher yield (Ramesh, 1997; Dosani *et al.* 1999). Improvement in quality parameters in tomato due to the application of poultry manure was recorded (Prabakaran and Jamespitchai, 2002).

Summarizing the results, application of organic N sources to the soil of tomato improved the quality parameters of tomato than control and 150 kg N as urea. Application of 150 kg N as poultry manure increased the net returns, gross returns, benefits cost ratio and yield with reduced nitrate and oxalic acid content. Application of 150 kg N through pressmud increased the shelf life, peel and seed weight per fruit with decreased moisture content. Control recorded lower gross and net returns, benefit cost ratio and yield. Application of 150 kg N in the form of urea recorded higher oxalic acid, nitrate and moisture content with decreased juice, peel content, seed weight and shelf life of tomato fruits.

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Research Notes

Twenty seven stars and seasonal rainfall forecast

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An indigenous knowledge is one that was built from thousands of years of experience and is a unique to a given culture and religion. This knowledge is being used from times immemorial by our forefathers for forecasting events such as weather, monsoon, optimum time for starting agricultural operations, *etc*. Almanacs, (Mishra and Dubhey, 1997) is based on astronomy in which stars (Naksatra) contribute a major part for predictions.

In order to find out the influence of stars on seasonal rainfall, an analysis was made at Department of Agricultural Meteorology, Tamil Nadu Agricultural University, Coimbatore-3 (11°N latitude and 77°E longitude) of Tamil Nadu. With the help of almanac (Panchanga), daily rainfall data were collected against 27 stars for 10 years (1991-2000) and the data were then grouped into seasonal (Cold Weather Period, Hot Weather Period, South West Monsoon and North East Monsoon) data. Thus grouped seasona rainfall data were vibratd for initial probabilit analysis at 30, 50 and 75 per cent levels an the results are presented as follows.

Considering the 30 per cent probabilit level, none of the star did influence the rainfal amount during Cold Weather Period (CWP) whereas Revathi star had offered higher chanc for getting 13.0 mm of rainfall during Ho Weather Period (HWP). The stars lik Miruhasirisham (11.4 mm), Kiruthigai (11. mm), Pooradam (9.1), Kettai (5.8), Uthirattath (5.5), Moolam (4.5) and Aailyam (3.5) als did influence the rainfall though not like Revath star. During South West Monsoon (SWM) period the star, Maham showed greater influence o rainfall upto 22.5 mm. The other stars namel Kirithigai, Miruhasirisham, Punarpoosam, Poosan Astham, Chittirai, Swathi and Anusham di influence rainfall with a range between 10 an