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Influence of mulches on quality parameters in gherkin cultivars (Cucumis sativus sub spp. Anguria)

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Abstract
An experiment was conducted during *kharif*, 2016 at College of Horticulture, Venkataramannagudem, West Godavari District of Andhra Pradesh to study the influence of mulches on quality parameters in gherkin. The experiment was laid out in a randomized block design (RBD) with different cultivars (Royal, Ajax and Chandini) and mulch applications (black plastic mulch, white plastic mulch, saw dust, coco peat and control). Among different mulch applications, white plastic mulch recorded significantly highest values for all quality parameters. Among the three cultivars, Chandini cultivar exhibited highest values.

Keywords: white plastic mulch, Chandini, quality, parameters

1. Introduction

Gherkin (*Cucumis sativus* sub spp. *anguria*) (2n= 24), belongs to the family Cucurbitaceae. It is popularly known as "Pickling cucumber" or small cucumber among farmers. It is monoecious, annual, trailing or climbing vine, which branches freely with slender, rough hairy, angled stems and tendrils. The leaves are 3 to 5 angled, shallow lobed with acute sinuses and 7 to 15 cm in length and oval to oblong in shape and born on long slender stalks. They are light green and turn yellowish when fully matured with or without spiky surface covered with long sharp glistering hairs. Flower is yellow in colour. The flesh is greenish in colour with many seeds. Seeds are small, white, smooth, 3 to 5 mm long. The immature fruits are used for the preparation of pickles, eaten as a cooked vegetable and are used in curries (Purseglove, 1969) [16]. The fruits and seed possess cooling properties. The fruit is also used as an astringent and antipyretic. The seed oil is used as antipyretic. Fruits are good for people suffering with constipation, jaundice and indigestion. Gherkins pickled in brine are a favourite lunch substitute in west. Due to the availability of the produce only for one season, high labour cost and other related problems, the European countries encourage production in developing countries like India where good agroclimatic conditions exist can produce gherkin round the year (Anonymous, 1995) [1]. It is a warm season crop and a temperature range of 18^0 – 32^0C is ideal for its growth and yield. The crop grows on a variety of soils rich in organic matter having a good drainage (Curwen, 1979) [3].

Gherkin is a quick income generating crop, the industry soon became popular over the last two decades and are also referred to as "cornichos" which is the French word for gherkin. It has been used in folk medicine to treat ailments. They are low in calories and fat. It has small amounts of potassium, iron, vitamin K. They were believed to have been the first ever pickle. It is propagated by using seeds.

The main objective of the grower is to produce maximum yield at the time when prices are high. This requires skillful decisions regarding selection of cultivars. Mulching is also a very important factor to influence the growth and yield (Barman *et al*., 2005) [2].

Mulching is the practice of covering the soil around the plant to make conditions more favourable for growth, development and efficient crop production (Nagalakshmi *et al*., 2002) [11]. Mulching also suppress weed infestation effectively. Furthermore it stimulates microbial activity in soil through increasing soil temperature, which improves agro physical properties of soil. It has a unique character of reducing the maximum soil temperature and increasing the minimum temperature (Solaiman *et al*., 2008) [18]. Polyethylene (PE) films as mulch material provide many positive advantages for the user such as increased yields, earlier maturing crops, higher quality produce, insect management and weed control (Lamont, 1993) [9].

Hence, standardization of good cultivar and mulching material for obtaining better growth and yield of gherkin is very important as this crop is a new introduction to this area. Therefore, the present investigation was carried out with this aim.

2. Materials and Methods

The present experiment is conducted during *kharif*, 2016 at

College farm, College of Horticulture, Venkataramannagudem, West Godavari District. The experiment was laid out in a randomized block design (RBD) with factorial concept replicated thrice with 15 different treatments involving different combinations of different cultivars (Royal, Ajax and Chandini) and mulches (black plastic mulch, white plastic mulch, saw dust, coco peat and control). The experimental area of 448 m^2 was divided into beds of 5 m x 1.5 m size. Irrigation channels of 1 m size were provided between two beds. Soil cover treatment (black plastic mulch, white plastic mulch, saw dust, coco peat and no mulch) were randomly distributed according to randomized block arrangement. The black and white plastic mulch of 25 microns each were used to cover the respective plots before sowing of the seed by cutting into pieces of 5.0 x 1.5 m to cover the crop area. After laying the mulch sheet, small circular holes were made with scissors with a spacing of 45 x 75 cm distance. The sheet was spread on the bed and seeds were sown through the holes already made. Saw dust and coco peat mulch were applied at a thickness of 5 cm each on the bed and seeds were sown at a required spacing of 45 x 75 cm distance. Sowing of the seeds was taken at a depth of less than 1 cm on raised beds of height 15 cm. 3-4 seeds were sown in each pit during first week of July. Each bed consisted of 12 plants, of which five competitive plants were selected at random for recording the observations. The crop was raised as per the recommended package of practices. Data was statistically analyzed by the methods outlined by Panse and Sukhatme (1985) [13].

3. Results and Discussion

The analysis of variance (ANOVA) revealed significant differences among all treatment combinations in quality parameters.

3.1 Cultivars

The effect of cultivars was found highly significant in quality parameters. Chandini cultivar was found to be superior over Ajax cultivar followed by Royal cultivar. The quality parameters like ascorbic acid content (mg/100g) (5.59), proteins (g/100g) (14.64), reducing sugars (%) (3.68), total sugars (%) (4.78) and TSS (^{0}Brix) (3.11) showed higher values for Chandini cultivar. Quality parameter *i.e.*, non-reducing sugars was found to be non-significant among the cultivars. Similar variations were also observed by Dematte and Simao (1985) [4] in cucumber, Madhumathi (1992) [10] in tomato, Kanwar *et al.* (2003) [7] in cucumber, Sudhakar *et al.* (2008) [19] in musk melon, Ramesh Babu (2011) [17] in onion, Narayana Swamy (2013) [11, 12] in capsicum, Pragathi (2014) [15] in cucumber and Keerthika *et al.* (2016) in cucumber.

3.2 Mulches

The quality parameters like ascorbic acid content (mg/100g) (5.82), proteins (g/100g) (15.95), reducing sugars (%) (3.61%), non-reducing sugars (%) (1.65%), total sugars (%) (4.69%) and TSS (^{0}Brix) (3.20) had recorded higher values for white plastic mulch. More number of fruits due to mulching could be due to its direct effect on suppressing weed flora and indirect effect on uptake of nutrients under the improved conditions of soil, particularly with respect to moisture availability and moderation of soil temperature. More over mulching with white plastic mulch also resulted in increased length of main vine which might probably responsible for the greater number of fruits. Such variations were also observed by Deoraoji and Chandrashekhar (2003) [5] in musk melon, Parmar (2011) [14] in water melon, Thippa Reddy (2013) [21] in chilli and Sushant (2014) [20] in pepper.

3.3 Interaction effect of cultivars and mulches

Quality parameters like ascorbic acid content (mg/100g) (6.37 mg/100g), proteins (g/100g) (16.60 g/100g), reducing sugars (%) (3.77%), total sugars (%) (5.06%), non-reducing sugars (%) (2.10%) and TSS (^{0}Brix) (3.37^{0}Brix). Similar variations were also observed by Habtamu Tegen *et al.* (2015) [6] in tomato.

The improvement in the quality parameters of gherkin in the present study might be due to better availability and uptake of nutrients which in turn might have lead to more nitrogenous compounds in plant tissues and ultimately resulted in their efficient metabolism.

Table 1: Effect of cultivars on quality parameters in gherkin

Cultivars	Ascorbic acid content (mg/100g)	Proteins (g/100g)	Reducing sugars (%)	Total sugars (%)	Non- reducing sugars (%)	TSS (^{0}Brix)
Royal	5.39	13.70	3.31	4.50	1.22	2.98
Ajax	5.59	14.02	3.37	4.53	1.12	2.98
Chandini	5.59	14.64	3.68	4.78	1.09	3.11
SE(m)	0.06	0.16	0.04	0.03	-	0.03
CD at 5%	0.17	0.47	0.11	0.10	*NS*	0.10

Table 2: Effect of mulches on quality parameters in gherkin

Mulches	Ascorbic acid content (mg/100g)	Proteins (g/100g)	Reducing sugars (%)	Total sugars (%)	Non- reducing sugars (%)	TSS (^{0}Brix)
Black plastic mulch	5.57	13.76	3.59	4.69	1.09	3.11
White plastic mulch	5.82	15.95	3.61	4.69	1.65	3.20
Saw dust	5.41	13.71	3.55	4.54	0.97	3.07
Coco peat	5.44	13.74	3.58	4.59	1.08	3.09
Control	5.39	13.43	2.93	4.52	0.92	2.65
SE(m)	0.07	0.21	0.05	0.04	0.05	0.04
CD at 5%	0.23	0.61	0.14	0.13	0.17	0.13

5. Conclusion

The study revealed that Chandini variety can be cultivated using white plastic mulch as mulch material for getting higher yield and therefore for obtaining good quality fruits.

From the results of the present investigation, it can be concluded that the Chandini variety with white plastic mulch proved to be the best for cultivation of gherkin in light soils of coastal Andhra Pradesh for getting higher economic yield.

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