Yield Potential of Different Organic Open-Pollinated Cucumber Lines

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Abstract

The variety evaluation of organic open-pollinated cucumber has a great impact to environment and food safety. It gives an idea to farmers in producing organic cucumber with a sustainable production and low input. The objectives of the study were to select OP cucumber lines under organic conditions suited in mid- elevation and evaluate its agronomic and yield performance. Ten OP cucumber lines including check variety(check variety, 10-6-1-1-1, 10-77-1-1-1 10-78-1-1-1, 10-79-1-1-1, 10-81-1-1-1, 10-82-1-1-1, 10-85-1-1-1, 10-86-1-1-1 and 10-87-1-1-1) were used as entries in three replications using randomized complete block design (RCBD). Different treatments did not vary on their agronomic performances. Different cucumber lines/varieties were resistant to highly resistant to Downey mildew and leaf spot and less resistant to aphids and leaf blight. The fruits were more or less uniform in size. Variations in fruit length and fruit diameter were observed. Check variety had the longest fruit diameter of 6.72 cm and OP cucumber 10-77-1-1-1 obtained the shortest diameter of 5.63 cm. Cucumber lines/varieties were highly palatable and highly prolific. Its shelf life ranged from 6 to 14 days. The fruit weighed from 427 g to 590 g. Cucumber line 10-78-1-1-1 got the highest yield of 61.73 tons/ha which was very much higher compared to the check variety followed by 10-79-1-1-1 of 55.47 tons/ha.Lowest yield was 38.20 tons/ha obtained by OP cucumber 10-87-1-1-1. OP cucumber 10-78-1-1-1 and 10-79-1-1-1 were suitable to organic environment in mid-elevation area.

Keywords: open-pollinated cucumber, organic cucumber, mid-elevation, sustainable product

1. Introduction

The market for organic produce is continuously growing due to consumer preference for organically grown produce over traditionally produced vegetables. Whereas earlier the seasons and the climate of an area determined what would be grown and when, today it is the "market" that determines what it wants and what should be grown (Agriquest). Consumers now are health conscious. They opt organically grown vegetables like cucumber compared to inorganic ones. Awareness for organic products is also increasing which made the price of these commodities higher. Production of organic vegetables should be given much attention to cope with the needs of the consumers.

Organic farmers must use organic seed material if such seed are available. If not available, conventional seeds can be used. This request exists in all accredited standards for organic farming. There are 251 different varieties of organic seed commercially available to organic farmers and growers, 98% of which are vegetable varieties and 1% are cereal varieties. Of the major crops, only few of the varieties most commonly used by organic producers are currently available as organic seed (Agriquest).

The total area under organic system is 31,502,786 ha in 2005-2006 (FiBL). The top countries in terms of production area are Australia (12,126,633 ha), China (3,466,570 ha), and Argentina (2,800,000 ha). For the Philippines, the reported organic area is 14,134 ha (0.12% of total cultivated area). But this is only for rice. Another 12,000 ha are grown to organic coconut and another few thousands to banana, pineapple, vegetables, and sugarcane. Most of these are certified organic by International Certifying bodies. Locally certified farms by OCCP number to just about 17 (Maghirang, 2010).

Since most of the varieties available commercially are conventionally produced, it is timely to develop varieties under local and organic conditions. The fact that the same varieties are being used in organic farms as in conventional farms does not mean that these are the best varieties for organic farming systems. Part of developing varieties is the selection under low input and under organic condition. Also, the variety to be used should be suited for organic cultivation, that is, it is generally resistant to insect pests and diseases. While some varieties perform well across locations, it is best to do the selection where the crop will be produced commercially to take into account the G x E interaction. The growers and the consumers should do the selection eventually to be sure that the varieties selected or developed will be

commercially viable (PCAARRD Organic vegetable seed production program).

Claveria is an upland agricultural land and is known as the vegetable bowl of Northern Mindanao. It has an elevation of 450-650 masl considered as mid-elevation. The area is potential for high value crops particularly vegetables due to its favourable climatic condition. Cucumber is commonly grown in the area as backyard gardening. Most of the varieties grown are hybrid and landraces. In this study, nine (9) OP cucumbers were tested as to its growth and yield performance.

Objectives of the Study

1. Select Open-Pollinated cucumber lines under organic conditions suited in mid- elevation

2. Evaluate the agronomic and yield performance of these cucumber lines.

2. Methodology

A field trial of Open-Pollinated Varieties (OPV) cucumber was conducted under organic conditions in mid-elevation. An area of 427 square meters was used in the trial. The trial was conducted using a randomized completed block design in three replications. Each plot measured 1 m in width and 5 m in length. Proper planting distance was followed, minimum isolation distance was observed. Other measures to maintain genetic or varietal purity were employed such as bagging and selfing for seed production. The yield trial started on July 2011 for the first cropping.

2.1 *Cultural Management*

The land was thoroughly prepared with the use of animal -drawn implements. Furrows were made 75 cm apart. Each plot was covered by plastic mulch to control the weeds. OP cucumber seeds were sown to bed and were transplanted to designated plots one (1) week after emergence. Vermicast and decomposed chicken dung were applied in a 1:1 ratio. Botanical pesticides (hot pepper, panyawan, OHN) were applied to control insect pest.

2.2 OP cucumber

Ten OP cucumber were used as entries in the yield trial including the Check variety: Check Var. 10-6-1-1-1, 10-77-1-1-1, 10-78-1-1-1, 10-79-1-1-1, 10-81-1-1-1, 10-82-1-1-1, 10-85-1-1-1, 10-86-1-1-1 and 10-87-1-1-1.

The data gathered were as follows: 1) Stand count - number of plants counted at first harvest; 2) Days to 1st and last harvest – number of days from transplanting to 50% of the plant population producing fruits at harvestable size; 3) Reaction to pest and diseases (downy mildew, leaf spot, aphids, leaf blight) – this was rated as to resistance and susceptibility of the plant to pest and diseases; 4) Fruit uniformity rating; 5) Fruit length, cm - taken from 10 fruit samples per entry ; 6)Fruit diameter, cm - taken from 10 fruit samples per entry; 7) Taste rating – tasted as to the palatability of the fruit; 8) Prolificacy rating - ; 9) Shelf life - taken by weighing 1kg fruits every two days until 50% deterioration was observed; 10) average weight per fruit - taken from 10 fruit samples per entry; 11) marketable yield- taken by weighing the marketable fruits per entry

3. Results and Discussions

3.1 Stand Count, Number of Days to First Harvest and Number of Days to Last Harvest of Different Cucumber Lines

The stand count, number of days to first harvest and number of days to last harvest of different OP cucumber are presented in Table 1. The maximum number of hills per plot was 20. Selection 10-78-1-1-1 had the perfect stand count. The least number of hills was obtained in selection 10-87-1-1-1 with 15.The earliest number of days to 1st harvest was 39 obtained by the check variety and selection number 10-85-1-1-1. The number of days to last harvest ranges from 60 to 63. Selection 10-87-1-1-1 had the latest number of days. No significant difference was observed in the three parameters.

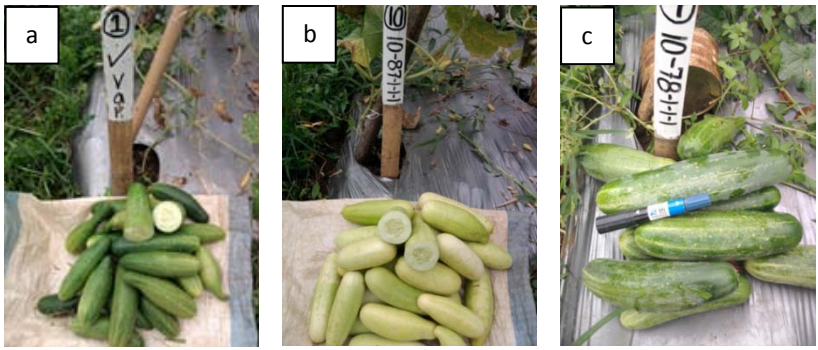

Figure 1. The check variety (a) obtained a yield of 48.27 tons ha^{-1}, cucumber line 10-87-1-1-1 (b) had the lowest plot of only 38.20 tons ha^{-1}, while cucumber line 10-78-1-1-1 (c) had the highest yield of 61.73 tons ha^{-1}.

Table 1. Stand count, number of days to first harvest and number of days to last harvest of different cucumber varieties

Selection/Entry Code	Stand count	Days to 1st harvest	Days to Last Harvest
Check variety	17	39	60
10-6-1-1-1	18	41	62
10-77-1-1-1	19	40	61
10-78-1-1-1	20	40	61
10-79-1-1-1	18	40	61
10-81-1-1-1	18	39	60
10-82-1-1-1	18	40	61
10-85-1-1-1	19	39	60
10-86-1-1-1	18	40	61
10-87-1-1-1	15	42	63
F-test	ns	ns	ns
CV, %	8.76	2.86	1.74

Reactions to pest and diseases: Downey mildew, leaf spot, aphids and leaf blight of different cucumber lines

The different cucumber lines were rated as to its reactions to pest and diseases such as Downey mildew, leaf spot, aphids, and leaf blight. Table 2 presents the reaction of OP cucumber to said pest and diseases. Almost all selections were resistant to Downey mildew except for 10-6-1-1-1 which was highly resistant. All selections were resistant to leaf spot and less resistant to aphids and leaf blight.

Fruit uniformity rating, fruit length, fruit diameter and taste rating of different cucumber lines.

Table 2. Reactions to pest and diseases: Downey mildew, leaf spot, aphids and leaf blight of different cucumber lines

Selection/Entry Code	Downy mildew	Leaf spot	aphids	Leaf blight
Check variety	4 [a]	3	1	1
10-6-1-1-1	5[a]	3	2	3
10-77-1-1-1	4 [a]	2	2	2
10-78-1-1-1	2[bc]	2	2	1
10-79-1-1-1	3 [b]	2	2	1
10-81-1-1-1	4 [a]	2	2	1
10-82-1-1-1	3 [b]	2	2	1
10-85-1-1-1	3 [b]	2	2	1
10-86-1-1-1	3 [b]	2	2	1
10-87-1-1-1	3 [b]	2	2	1
F-test	*	-	ns	ns
CV, %	17.59	-	21.94	20.00

*Means in a column with the same letter are not significantly different with each other.

The fruit uniformity rating ranges from 3 to 5 as shown in Table 3. Analysis of variance showed no significant difference between the treatment means. The different cucumber lines vary in fruit length. The length ranges from 17 cm to 24 cm. The shortest fruit was obtained in cucumber line 10-77-1-1-1 and 10-79-1-1-1 whereas selection 10-78-1-1-1 had the longest fruit of 24.73 cm. Based on statistical analysis different lines varies greatly in their fruit length.

The check variety had the longest fruit diameter of 6.72 cm and OP cucumber 10-77-1-1-1 obtained the shortest diameter of 5.63 cm.

Cucumber lines 10-6-1-1-1, 10-77-1-1-1 and 10-78-1-1-1 had the taste ratings of 4 and 5 which were highly palatable.

Table 3. Fruit uniformity, fruit length, fruit diameter and taste of different cucumber lines

Selection/Entry Code	Fruit uniformity	Fruit length	Fruit diameter	Taste
Check variety	4	22.80^{ab}	6.72	4
10-6-1-1-1	5	22.83^{ab}	6.10	5
10-77-1-1-1	3	17.37^{c}	5.63	5
10-78-1-1-1	4	24.73^{a}	6.23	5
10-79-1-1-1	4	17.37^{c}	6.03	4
10-81-1-1-1	3	19.53^{abc}	6.17	4
10-82-1-1-1	3	18.73^{abc}	5.97	4
10-85-1-1-1	3	18.60^{c}	6.07	4
10-86-1-1-1	3	21.07^{ab}	5.93	4
10-87-1-1-1	3	18.30^{c}	6.10	4
F-test	ns	**	ns	ns
CV, %	10.20	7.52	7.75	4.16

*Means in a column with the same letter are not significantly different with each other.

Prolificacy rating, shelf life, average weight per fruit, marketable yield per plot and marketable yield per hectare of different cucumber lines

Table 4 presents the prolificacy rating, shelf life, average weight per fruit, marketable yield per plot and marketable yield per hectare of different cucumber lines. The cucumber lines planted were highly prolific. It has a rating of 4-5. The shelf life of the OP cucumber ranged from 6 to 14 days. OPlines 10-81-1-1-1 had the shortest shelf life of only 6 days while 10-78-1-1-1 had 14 days.

Table 4. Prolificacy rating, shelf life, average weight per fruit, marketable yield per plot and marketable yield per hectare of different cucumber lines

Selection/Entry Code	Prolificacy rating	Shelf life	Ave. weight per fruit	Marketable yield, tons/ha
Check variety	4	10	585 [a]	48.27 [c]
10-6-1-1-1	4	8	567 [a]	40.87 [e]
10-77-1-1-1	4	8	427 [c]	45.20 [d]
10-78-1-1-1	5	14	580 [a]	61.73 [a]
10-79-1-1-1	4	7	460 [b]	55.47 [b]
10-81-1-1-1	4	6	483 [b]	40.00 [e]
10-82-1-1-1	4	8	508 [ab]	49.60 [c]
10-85-1-1-1	4	8	470 [b]	49.27 [c]
10-86-1-1-1	4	9	590 [a]	47.40 [cd]
10-87-1-1-1	4	8	560 [a]	38.20 [f]
F-test	-	-	*	**
CV, %	-	-	11.22	12.23

* Means in a column with the same letter are not significantly different with each other.

The heaviest fruit weight was observed in cucumber line 10-87-1-1-1 but not significantly higher compared to the check variety, cucumber line 10-78-1-1-1, 10-87-1-1-1,10-82-1-1-1, 10-78-1-1-1 and 10-77-1-1-1.Fruit weight rangedfrom 427 g to 590 g.Lightest fruit was obtained bycucumber line 10-77-1-1-1. Heavy weight could be attributed by the fruit length.

The marketable yield per hectare ranged from 38tons/ha to 61.73 tons per ha. Highest marketable yield was observed in 10-78-1-1-1 which was significantly higher compared to the check variety.Cucumber line10-87-1-1-1 had the lowest marketable yield. A highly significant difference was observed in the marketable yield of cucumber lines based on the Analysis of variance. Figure 1 shows the comparison the yield of three cucumber lines (check variety, 10-87-1-1-1 & 10-78-1-1-1)

4. Conclusions and Recommendations

Different cucumberlines has no significant effect on the agronomic parameters like stand count, days to 1st harvest , days to last harvest, fruit uniformity and taste. A significant difference was observed in the yield and yield components of nine cucumber lines.

Cucumber line 10-78-1-1-1 hadsignificantly higher marketable yield which is comparable to the check variety.It is also highly resistant to pest and diseases.

Based on the results of the study the following are recommended: (1) A second yield trial will be conducted in all entries; (2) An on-farm trial will also be conducted after the 2nd trial.

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