

**PERCEPTIONS OF FARMERS ON THE IMPACTS OF *Chromolaena odorata* (L.) KING AND ROBINSON IN THE ZAMBOANGA PENINSULA, THE PHILIPPINES****Lina T. Codilla****JH Cerilles State College, Mati, San Miguel, Zds****Cell Phone Nos.: 0917701246****Funded by: Philippines CHED HEDF-FDP****Social Science****Abstract**

This study was conducted to determine the perceptions of farmers regarding the impacts of the invasive plant *C. odorata* to farmlands in three Provinces of the Zamboanga Peninsula, Philippines. This was done by determining: (1) the socio-demographic profile of farmers in terms of age, civil status, educational attainment, farm size, occupation of spouse, number of dependents, number of years in farming and source of income; and (2) the perception of farmers on the impact of *C. odorata* in terms of its infestation in farmlands, its possible effects to crop yield and livestock, if actions were undertaken to reduce damage of crops or animals, and if management approaches increase farming expenses.

A Likert's scale-patterned questionnaire was developed and used to guide interviews with 100 farmers who were purposively selected from different places in three Provinces of the Zamboanga Peninsula. Twenty five (25) municipalities of the three Provinces (9 from Zamboanga del Sur, 9 from Zamboanga del Norte, 7 from Zamboanga Sibugay) were passed along and 3 to 6 farmers were interviewed in every municipality. This survey was conducted last 24-27 October 2011.

Majority of respondents claimed that the modal size of 10-20% of farm areas was inhabited by *C. odorata*. The invasive species has considerable negative impacts to mostly coconut, mango, and banana farmlands in terms of crop production, livestock rearing, and management strategies in reducing damage on crops and minimizing farming expenses. In contrast, some respondents claim of positive uses of *C. odorata* such as for medicinal purposes and as farm fallow plant. However, its disadvantages surpass its advantages, hence, respondents perceived that uncultivated areas in three provinces of Zamboanga Peninsula should be utilized to maximize production and to prevent the invasion of *C. odorata*.

**Keywords:** *Chromolaena odorata* L., invasive, agriculture, Likert's scale

## INTRODUCTION

*Chromolaena odorata* (L.) King and Robinson (*Eupatorium odoratum*), is a perennial scrambling shrub of neotropical origin that forms dense angled bushes of up to 3 m in height (Strathie-Korrubel, 2000 as cited in Tefera and Dlamini, 2008). It is known as a major problem in agricultural lands and commercial plantations (Binggeli, 1997). It invades most areas in the humid paleotropics and subtropics (McFadyen and Skarratt, 1996). It has already become a serious weed in South Africa, India, China, Indonesia, East Timor and the Philippines (Vanderwoude et al., 2005). It is one of the worst weeds in the world, affecting agriculture and biodiversity in the tropical and subtropical regions of the Old World (Zachariades, 2009). It also affects human livelihood (Holm et al., 1977; Liggitt, 1983; Macdonald, 1983; Muniappan and Marutani, 1988; Goodall and Erasmus, 1996; Hoevers and M'Boob, 1996; McWilliam, 2000).

In the Philippines, Musico et al., (1994) reported that *C. odorata* (commonly called *hagonoy*) is considered as one of the most serious weeds in the country. According to Sajise et al. (1972, 1974), in the Philippines, this weed poses danger not only to crops but also invades open fields and pasture lands. Very recently, Codilla and Metillo (2011) estimated an abundance of  $15 \times 10^4$  individual *C. odorata* plants per hectare in three Provinces of the Zamboanga Peninsula.

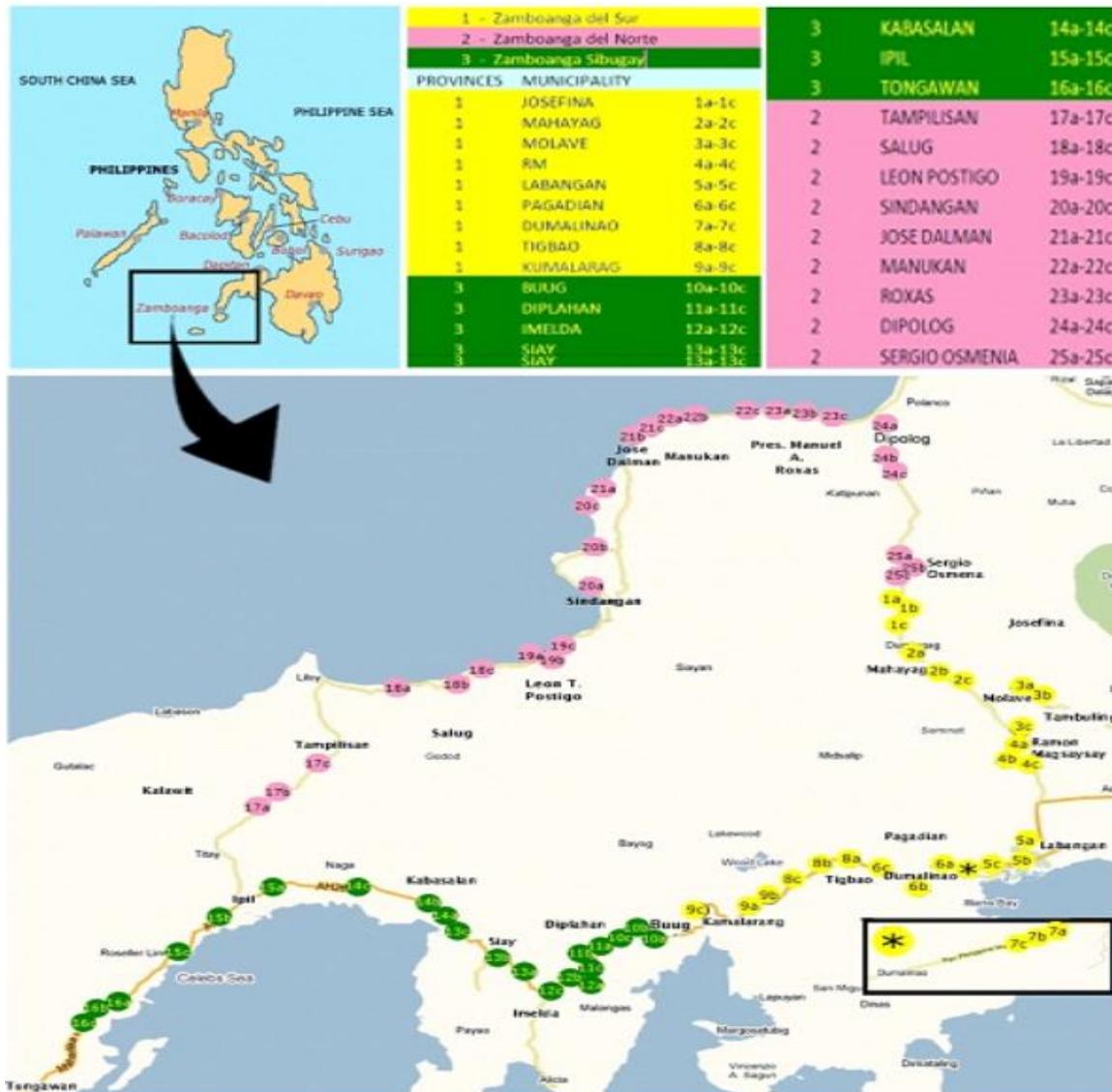
After its introduction to the Philippines in the 1960s or about 50 years ago (Pancho and Plucknett, 1971), there is a need to survey the perception of farmers regarding the impact of *C. odorata* species to farmlands in the three provinces of Zamboanga Peninsula, Philippines. This was done by determining: (1) the socio-demographic profile of farmers in terms of age, civil status, educational attainment, farm size, occupation of spouse, number of dependents, number of years in farming and source of income; and (2) the perception of farmers on the impact of *C. odorata* in terms of its infestation in farmlands, its possible effects to crop yield and livestock, if actions were undertaken to reduce damage of crops or animals, and if management approaches increase farming expenses.

## MATERIALS AND METHODS

A Likert's scale-guided questionnaire was developed to determine the perception of farmers regarding the impact of *C. odorata* in three Provinces of Zamboanga Peninsula. One hundred questionnaires were brought during the survey conducted in three Provinces of Zamboanga Peninsula (Figure 1). The starting point of the survey was in Pagadian City through Dipolog City via Dumingag, Zamboanga del Sur. Then the route back from Dipolog City to Pagadian City was via Ipil, Zamboanga Sibugay. With this route, 25 municipalities of the three Provinces (9 from Zamboanga del Sur, 9 from Zamboanga del Norte, 7 from Zambonga Sibugay) were passed along and 3 to 6 farmers were interviewed in every municipality. This survey was conducted last 24-27 October 2011.

During the survey, farms that were passed along were considered and owners or farmers were requested to answer the questions in the prepared questionnaire. The answers of farmers were then processed accordingly.

Figure 1. Municipalities in the Zamboanga Peninsula. Inset is the map of the Philippines with the Peninsula enclosed in a rectangle. Numbered circles 1-9, 10- 17, 17-24, are parts of Zamboanga del Sur, Zamboanga Sibugay, and Zamboanga del Norte Provinces, respectively.



## RESULTS

Site of the survey and number of respondents involved

Table 1 shows that out of 100 farmers (respondents) interviewed during the survey, 33% come from 9 municipalities in Zamboanga del Sur, 33% also come from 7 municipalities in Zamboanga Sibugay, and 34% come from 9 municipalities in Zamboanga del Norte of which the number of respondents ranges from 3 to 6 per municipality.

Table 1. Number of farmers interviewed from Municipalities of (A) Zamboanga del Sur (N = 33), (B) Zamboanga Sibugay (N = 33), and (C) Zamboanga del Norte (N = 34) where *C. dorata* were found to invade crop plantations.

	Frequency Distribution				Total Frequency	Percent (%) Distribution
	Coconut farmers	Banana / Mango farmers	Cassava/ Vege farmers	Corn / Rice farmers		
<b>B. Zamboanga del Sur Municipalities</b>						
Josefina	2 (40.0)	1 (20.0)	2 (40.0)	0	5	15.2
Mahayag	1 (33.3)	0	2 (66.7)	0	3	9.1
Molave	1 (33.3)	1 (33.3)	1 (33.3)	0	3	6.1
Ramon Magsaysay	2 (40.0)	1 (20.0)	0	1 (20.0)	4	15.2
Labangan	1 (25.0)	1 (25.0)	2 (50.0)	0	4	12.1
Pagadian	1 (33.3)	1 (33.3)	1 (33.3)	0	3	9.1
Dumaliniao	1 (33.3)	0	1 (33.3)	1 (33.3)	3	9.1
Tigbao	1 (20.0)	1 (20.0)	2 (40.0)	1 (20.0)	5	15.2
Kumalarang	1 (33.3)	0	1 (33.3)	1 (33.3)	3	9.1
<b>Total</b>	<b>11 (33.3)</b>	<b>6 (18.2)</b>	<b>12 (36.4)</b>	<b>4 (12.1)</b>	<b>33</b>	<b>100</b>
<b>B. Zamboanga Sibugay Municipalities</b>						
Buug	1 (33.3)	0	0	2 (66.7)	3	9.1
Diplahan	3 (60.0)	0	0	2 (40.0)	5	15.2
Imelda	3 (60.0)	1 (20.0)	0	1 (20.0)	5	15.2
Siay	3 (50.0)	1 (16.7)	1 (16.7)	1 (16.7)	6	18.2
Kabasalan	2 (40.0)	1 (20.0)	1 (20.0)	1 (20.0)	5	15.2
Ipil	2 (50.0)	0	1 (25.0)	1 (25.0)	4	12.1
Tongawan	2 (40.0)	1 (20.0)	1(20.0)	1 (20.0)	5	15.2
<b>Total</b>	<b>16 (48.5)</b>	<b>4 (12.1)</b>	<b>4 (12.1)</b>	<b>9 (27.3)</b>	<b>33</b>	<b>100</b>
<b>C. Zamboanga del Norte Municipalities</b>						
Tampilisan	2 (50.0)	1 (25.0)	0	1 (25.0)	4	11.8
Salug	2 (50.0)	1 (25.0)	1 (25.0)	0	4	11.8
Leon Postigo	2 (50.0)	1 (25.0)	0	1 (25.0)	4	11.8
Sindangan	1 (33.3)	1 (33.3)	0	1 (33.3)	3	8.8
Jose Dalman	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)	4	11.8
Manukan	2 (50.0)	1 (25.0)	0	1 (25.0)	4	11.8
Roxas	2 (50.0)	1 (25.0)	0	1 (25.0)	4	11.8
Dipolog	1 (33.3)	1 (33.3)	1 (33.3)	0	3	8.8
Sergio Osmena	2 (50.0)	1 (25.0)	0	1 (25.0)	4	11.8
<b>Total</b>	<b>15 (44.1)</b>	<b>9 (26.5)</b>	<b>3 (8.8)</b>	<b>7 (20.6)</b>	<b>34</b>	<b>100</b>

### B. Socio-demographic profile of respondents

Results of this study shows that out of the 33 respondents from Zamboanga del Sur, majority are between 41-60 years of age (90.9%), while few are below 40 (3%) and above 61 years of age (6.1%). Out of the 30 respondents who are 41-60 years old, 33.3% are coconut farmers, 10% are banana/mango farmers, 43.3% are cassava/vegetable farmers and 13.3% are corn/rice farmers. Married respondents comprise 81.8% while widow/widower only 18.2%. Only 3% of the respondents is a college graduate and 0% are college level while most of the farmers 97% reached only elementary or high school level. Most of the farmers (93.9%) owned 2 to 5 hectares of farmland, only 3% owned 6 to 10 hectares and 3% also owned 2 hectares or below. Most of the farmers' spouses are unemployed (48.5%), while 33.3% are employed in private and 18.2% in government institutions. Respondents who indicated that farming is their main source of income comprise 84.8% while farmers who have other sources of income comprise 15.2%. Likewise, respondents who have 1 to 3 dependents comprise 63.6% and farmers who have 4 to 6 dependents comprise 36.4% only. Most of the farmers (45.5%) are already 11-20 years in farming, 39.4% are below 10 years, 6.1% are 21-30 years while 9.1% are 31 years and above in farming.

This study also shows that for Zamboanga Sibugay, out of the 33 respondents, majority are between 41-60 years of age (84.8%), while few are below 40 (6.1%) and above 61 years of age (9.1%). Married respondents comprise 100% while widow/widower 0%. No one from the respondents is a college graduate and 15.2% are college level while most of the farmers 84.8% reached only elementary or high school level. Most of the farmers (78.8%) owned 2 to 5 hectares of farmland, only 6.1% owned 6 to 10 hectares and 15.2% also owned 2 hectares or below. Most of the farmers' spouses are unemployed (93.9%), while only 3.0% are employed in both private and in government institutions. Respondents who indicated that farming is their main source of income comprise 75.8% while farmers who have other sources of income comprise 24.2%. Likewise, farmers who have 1 to 3 dependents comprise 57.6% and farmers who have 4 to 6 dependents comprise 42.4% only. Most of the respondents (48.5%) are below 10 years in farming, 36.4% are 11 – 20 years, 15.2% are 21-30 years while no one is 31 years and above in farming.

In addition, this study also shows that for Zamboanga del Norte, out of the 34 respondents, majority are between 41-60 years of age (73.5%), while few are below 40 (17.6%) and above 61 years of age (8.8%). Married respondents comprise 85.3% while widow/widower 14.7%. No one from the respondents is a college graduate and 11.8% are college level while most of the farmers 88.2% reached only elementary or high school level. Most of the farmers (82.4%) owned 2 to 5 hectares of farmland, only 5.9% owned 6 to 10 hectares and 11.8% also owned 2 hectares or below. Most of the farmers' spouses are unemployed (70.6%), while only 14.7% are employed in both private and in government institutions. Respondents who indicated that farming is their main source of income comprise 52.9% while farmers who have other sources of income comprise 47.1%. Likewise, respondents who have 1 to 3 dependents comprise 73.5% and respondents who have 4 to 6 dependents comprise 26.5% only. Most of the respondents (58.8%) are 11 – 20 years, 17.6% are both below 10 years and 21-30 years in farming while only 5.9% are 31 years and above in farming.

### C. Estimated area of farmlands in three Provinces of the Zamboanga Peninsula invaded by *C. odorata*

Table 2A shows that 30.3% of the respondents from Zamboanga del Sur indicated that their estimated area of farmland invaded or infested with *C. odorata* is below 10%, about 60.6% confirmed that the invaded or infested area is 11-20%, only 9.1% confirmed that the invaded or infested area is 21-30% and 0% indicated that it is more than 30%. This implies that *C. odorata* has invaded or infested

about 11-20% of estimated farmland area in Zamboanga del Sur and that the kind of farmland that is greatly invaded or infested with *C. odorata* in Zamboanga del Sur is cassava.

Table 2. Estimated area of farmland invaded by *C. odorata* in (A) Zamboanga del Sur (N = 33), (B) Zamboanga Sibugay (N= 33), and (C) Zamboanga del Norte (N= 34).

	Coconut farmers	Banana / Mango farmers	Cassava / Vege farmers	Corn / Rice farmers	Total Frequency	Percent (%) Distribution
<i>A.Zamboanga del Sur</i>						
10% & below	3 (30.0)	4 (40.0)	3 (30.0)	0	10	10
11 – 20%	2 (10.0)	5 (25.0)	10 (50.0)	3 (15.0)	20	20
21 – 30%	0	2 (66.7)	0	1 (33.3)	3	3
Above 30%	0	0	0	0	0	0
Total	5	11	13	4	33	
<i>B.Zamboanga Sibugay</i>						
10% & below	2 (20.0)	6 (60.0)	2 (20.0)	0	10	10
11 - 20%	2 (9.1)	9 (40.9)	2 (9.1)	9 (40.1)	22	22
21 – 30%	0	1 (100.0)	0	0	1	1
Above 30%	0	0	0	0	0	0
Total	4	16	4	9	33	
<i>C.Zamboanga del Norte</i>						
10% & below	6 (40.0)	6 (40.0)	3 (20.0)	0	15	15
11 - 20%	3 (16.7)	9 (50.0)	0	6 (33.3)	18	18
21 – 30%	0	0	0	1 (100.0)	1	1
Above 30%	0	0	0	0	0	0
Total	9	15	3	7	34	

A similar percentage (30.3) of the respondents from Zamboanga Sibugay indicated that their estimated area of farmland invaded or infested with *C. odorata* is below 10%, but about 67.7% confirmed that the invaded or infested area is 11-20%, only 3.0% confirmed that the invaded or infested area is 21-30% while 0% indicated that it's more than 30% (Table 2B). This implies that *C. odorata* has invaded or infested about 11-20% of estimated farmland area in Zamboanga Sibugay and that the kind of farmland that is greatly invaded or infested with *C. odorata* in Zamboanga Sibugay are banana/mango as well as corn/rice.

A higher percentage (44.1) of the respondents from Zamboanga del Norte indicated that their estimated area of farmland invaded or infested with *C. odorata* is below 10%, about 52.9% confirmed that the invaded or infested area is 11-20%, only 2.9% confirmed that the invaded or infested area is 21-30% while 0% indicated that it's more than 30% (Table 2C). This implies that *C. odorata* has invaded or

infested about 11-20% of estimated farmland area in Zamboanga del Norte and that the kind of farmland that is greatly invaded or infested with *C. odorata* in Zamboanga del Norte is banana/mango.

Overall, the crops that are greatly affected with *C. odorata* in three Provinces of Zamboanga Peninsula are cassava/vegetables in Zamboanga del Sur, banana/mango and corn/rice in Zamboanga Sibugay and banana/mango in Zamboanga del Norte. It also indicates that most of the farmers believed that only 11–20% of their farmland is invaded or infested with *C. odorata*.

#### D. Perception of farmers on the impact of *C. odorata* on farmlands in three Provinces of the Zamboanga Peninsula

This study reveals that most of the farmers in Zamboanga del Sur (39.4%) strongly agree and 60.6% agree that farming is their main source of income. About 75.8% of farmers strongly agree and 24.2% agree that the land is cultivated with more than one crop and 3% of farmers strongly agree and 97% farmers agree that not part of their land is barren. Many farmers (36.4%) strongly agree and 63.6% agree that *C. odorata* was prevalent at the start of their farming. About 15.2% strongly agree and 66.7% agree that *C. odorata* significantly affect crop yield. Only 9.1% agree and 78.8% disagree that *C. odorata* affects animal livestock. Likewise, *C. odorata* has been found to have significant impact on farmland by 51.5% of farmers while 48.5% farmers disagree that *C. odorata* have significant impact on farmlands. Few (6.1%) strongly agree, but the majority (45.5%) agree that actions were already taken to reduce damage of *C. odorata* on crops or animals and 69.7% agree that the management employed to eliminate *C. odorata* significantly increased farming expenses.

Likewise, this study shows that most of the farmers (33.3%) strongly agree and 66.7% agree that farming is their main source of income in the Province of Zamboanga Sibugay. About 63.6% of farmers strongly agree and 36.4% agree that the land is cultivated with more than one crop and 21.2% of farmers strongly agree and 78.8% farmers agree that not part of their land is barren. Many farmers (26.4%) strongly agree and 63.6% agree that *C. odorata* was prevalent at the start of their farming. However, 6.1% strongly agree and 63.6% agree that *C. odorata* significantly affect crop yield. Only 9.1% agree and 90.8% disagree that *C. odorata* affects animal livestock. Likewise, *C. odorata* has been found to have significant impact on farmland by 78.5% of farmers while 21.2% farmers disagree that *C. odorata* have significant impact on farmlands. Many farmers (75.8%) strongly agree but (24.2%) disagree that actions were already taken to reduce damage of *C. odorata* on crops or animals and 51.5% agree that the management employed to eliminate *C. odorata* significantly increased farming expenses.

In addition, this study also shows that most of the farmers in Zamboanga del Norte (70.5%) strongly agree and 29.5% agree that farming is their main source of income. About 55.9% of farmers strongly agree and 44.1% agree that the land is cultivated with more than one crop and 35.3% of farmers strongly agree and 64.7% farmers agree that not part of their land is barren. Many farmers (47.1%) strongly agree and 52.9% agree that *C. odorata* was prevalent at the start of their farming. However, 20.6% strongly agree and 35.3% agree that *C. odorata* significantly affect crop yield. Only 17.6% agree and 79.4% disagree that *C. odorata* affects animal livestock. Likewise, *C. odorata* has been found to have significant impact on farmland by 64.7% of farmers while 35.3% farmers disagree that *C. odorata* have significant impact on farmlands. Few farmers (8.8%) strongly agree and many (55.9%) agree that actions were already taken to reduce damage of *C. odorata* on crops or animals and 73.5% agree that the management employed to eliminate *C. odorata* significantly increased farming expenses.

E. Weeds that grow with *C. odorata* on farmlands in three Provinces of Zamboanga Peninsula

Table 3 shows the common weeds that are observed by respondents to be growing with *C. odorata* in their farmlands. In the Province of Zamboanga del Sur, *P. conjugatum* (carabao grass) was most commonly identified (69.7%), second in rank was *I. cylindrica* (cogon grass) (45.4%) and the third in rank was *A. aciculatus* (amorsiko) (42.4%). The same top two plants were identified (*P. conjugatum*, 61.8% and *I. cylindrica*, 52.9%) in the Province of Zamboanga del Norte, but the third was *D. ciliaris* (crab grass) (35.3%). In Zamboanga Sibugay, the most common weed was *P. conjugatum*, the second *A. aciculatus* (48.5%) (common name) and the third were both *D. ciliaris* and *I. cylindrica* (30.3%). In general, for the whole Province of Zamboanga Peninsula, *P. conjugatum* (carabao grass) has been observed by most of the farmers to be growing with *C. odorata* in their farmlands. Next in rank were *I. cylindrica* (cogon grass) and *A. aciculatus* (amorsiko),

Table 3. Weeds that grow together with *C. odorata* in the farmlands in three provinces of Zamboanga Peninsula.

Scientific name	Local name	Number of farmers (per Province) who have observed the weeds associated with <i>C. odorata</i> (n=100)		
		ZS	ZN	ZB
<i>Alocasia macrorrhiza</i> L.	<i>badiang</i>	2 (6.1)	1 (2.9)	0
<i>Amaranthus spinosus</i> L.	<i>kulitis</i>	4 (12.1)	1 (2.9)	2 (6.1)
<i>Andropogon aciculatus</i> R.	<i>amorsiko</i>	14 (42.4)	11 (32.4)	16 (48.5)
<i>Athyrium esculentum</i> R.	<i>pako</i>	4 (12.1)	2 (5.9)	1 (3.0)
<i>Colocasia esculenta</i> L.	<i>gabi</i>	6 (18.2)	2 (5.9)	1 (3.0)
<i>Digitaria ciliaris</i> R.	<i>crab grass</i>	7 (21.2)	12 (35.3)	10 (30.3)
<i>Eleusine indica</i> L.	<i>palagtiki</i>	5 (15.2)	3 (8.8)	1 (3.0)
<i>Hyptis capitata</i> J.	<i>butones</i>	1 (3.0)	1 (2.9)	2 (6.1)
<i>Imperata cylindrica</i> L.	<i>cogon grass</i>	15 (45.4)	18 (52.9)	10 (30.3)
<i>Ipomoea triloba</i> L.	<i>kamu-kamute</i>	10 (30.3)	4 (11.8)	8 (24.2)
<i>Mimusa pudica</i> L.	<i>makahiya</i>	3 (9.1)	2 (5.9)	7 (21.2)
<i>Paspalum conjugatum</i> L.	<i>carabao grass</i>	23 (69.7)	21 (61.8)	26 (78.8)
<i>Sorghum halepense</i> L.	<i>batad batadan</i>	0	1 (2.9)	0

ZS = Zamboanga del Sur; ZN = Zamboanga del Norte; ZB = Zamboanga Sibugay.

Table 4 shows that *C. odorata* is known to most farmers (88%) as a herbal or medicinal plant (e.g. for burns, hemorrhages, hemorrhoids, indigestion, skin diseases, traumatic injury, edema, fracture and infection). It is also observed by 37% of farmers to dominate fallow lands, and 15% of farmers observed it to serve as hiding place or breeding grounds of pests.

Table 4. Common uses of *C. odorata* in three provinces of Zamboanga Peninsula as observed by farmers.

	Zamboanga del Sur	Zamboanga Sibugay	Zamboanga del Norte	Total number of respondents
Herbal / medicinal	25	29	34	88
Dominant in fallow	18	10	9	37
Animal pest hiding place	3	7	5	15

## DISCUSSIONS

The invasion of *C. odorata* in the Provinces of the Zamboanga Peninsula is primarily attributed to its ability to thrive on all types of well-drained soil and can essentially grow on any tropical soil even of relatively low in fertility (Pacific Island Ecosystems at Risk, 2001, Codilla and Metillo, 2011). Once established, *C. odorata* competes aggressively with herbs, grass, and shrubs in open areas like roadsides, riverbanks, vacant lots, abandoned farmland, and neglected pastures (Pacific Island Ecosystems at Risk, 2001; Oropa, 2004).

In this study, results reveal that farming is the main source of income of most farmers. Their farmlands are cultivated with various types of crops. This study also reveals that *C. odorata* has infested their farmlands since they started farming. The spread of the weed has significantly affected their crop yield, because *C. odorata* is an effective competitor and also releases allelochemicals (Oropa, 2004). Farmers tried to reduce the damage by employing some methods of weeding (e.g. slashing, herbicide application, uprooting, burning) but such actions increase farming expenses. For instance, they have to spend for 1 qrt of herbicide for a hectare of *C. odorata*. On average, a farm owner pays about US\$5 (August 2011 exchange rate: PhP42.00 to US\$1.00) per 500 m<sup>2</sup> per day per slasher, and the cost doubles if uprooting individual weed is involved (Codilla and Metillo, 2011).

The survey also reveals that *C. odorata* affects the livestock of some farmers. This is caused by the high levels of nitrate in its leaves, especially the young ones, which are toxic to animals (Sajise et al., 1974). Thus grazing animals avoid it, and if forced-feed, animals can develop liver sclerosis and even die (Oropa, 2004). *Chromolaena odorata* also makes the grazing field unavailable for livestock due to the rapid expansion of the weed particularly in colonizing disturbed soil, achieving fast succession and dominant coverage in localized areas (Monk et al., 1997).

Farmers have also observed that only a few plant species are associated with *C. odorata* in their farmlands. The most common are *P. conjugatum* L. (carabao grass), *I. cylindrica* L. (cogon grass) and *A. aciculatus* R. (*amorsiko*). The very few weeds that co-exist with *C. odorata* could be attributed to its allelopathic property (Muniappan 1994; Timbilla and Braimah, 1991). According to farmers in East Timor, *C. odorata* is easy to clear and burn, but it also reduces the harvest yields of their staple maize crops (Gill et al., 1993; Sahid and Sugau, 1993; Ambika, 1998 as cited in McWilliam, 2000). With these

effects of *C. odorata* to crops as well as to livestock, farmers in three Provinces of the Zamboanga Peninsula believed that the invasive weed has greatly impacted their farmlands.

On the other hand, most farmers told interviewers that *C. odorata* has medicinal or herbal value from their experience that extract from crushed young leaves can be used to treat skin wounds. This concur with the findings of Triratana et al. (1991) that extracts of *C. odorata* leaves can be used to accelerate blood clotting, sore throats and colds and also to scent aromatic baths (Liogier, 1990). Its extracts have been shown to inhibit or kill *Neisseria gonorrhoeae* (the organism that causes gonorrhoea) *in vitro* (Caceres et al., 1995).

Other observations of some farmers regarding other uses of *C. odorata* (e.g., the weed was used in fallow areas to make soil fertile), coincide with the findings of M'Boob (1991) that during fallows between cultivation, *C. odorata* adds copious amounts of organic matter to the soil through the recycling of substantial leaf matter (Dove, 1984; Monk et al., 1997; Anwarulla and Chandrashekar, 1998 as cited in McWilliam, 2000) and may reduce the populations of nematodes (M'boob, 1991). It is also useful as mulch for row crops (Swennen and Wilson, 1984 as cited in McWilliam, 2000) and also served as hiding places of pests. This confirmed with the observation of Orapa (2004) that *C. odorata* can harbor pests such as locusts, rats, wild pigs and crop disease-carrier organisms (Boppré 1991).

This study, therefore, demonstrates that *C. odorata* has great impact to farmlands. First, is on crop production because crops are affected due to competition and allelopathy (Rouw, 1991). *C. odorata* also serves as hiding places or breeding grounds for pests (Orapa, 2004). As farmers employ methods to eliminate the weeds, farming expenses is increased, reducing their income. Second, is on livestock raring because animals avoid the weed. Since *C. odorata* species dominate the field, grazing area is reduced. However, despite this present condition, there are currently no government-funded research or management programs to control the weed or assess its impact on the farmlands in Zamboanga Peninsula or Philippines in general. No study has been done yet on the biological control of *C. odorata* (Aterrado, 1987 as cited in Musico et al., 1994) to help reduce farmers' expenses in eliminating the weed.

## CONCLUSION AND RECOMMENDATION

The survey reveals that most respondents owned small farms averaging 2 – 5 hectares. Most of them have been farming for more than 10 years to support their respective families since farming is their main source of income, though some have employed spouse while others have small business. The majority of respondents belong to the middle-age groups, married and attain only elementary or high school level.

Most of the farmers confirmed that about 11-20% of their farmlands is affected by *C. odorata*. The most common weeds that still grows with *C. odorata* are *P. conjugatum*, *I. cylindrica* and *A. aciculatus* only. Most farmers claimed that *C. odorata* has other uses like medicine and as fallow plants.

The survey also showed that *C. odorata* has a considerable negative influence to farmlands in three Provinces of Zamboanga Peninsula, Philippines, in terms of crop production and livestock rearing. Thus, it is recommended that elimination of the weed should be done in order to minimize farmers' losses (expenses spent for removing the weed and loss of productive farming time), and that utilization of uncultivated areas in three provinces of Zamboanga Peninsula should be maximized to prevent invasion of *C. odorata*.

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