6. Kibosho Girls

The Effect of Pesticides & The Decline Of Biodiversity

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Introduction:
We had observed that in areas where pesticides are constantly used, there were few weeds. For example in our school vegetable garden, where pesticides are not used, there was abundance of weeds and insects while in another garden in the nearby village there were rare weeds. We had an hypothesis that the loss of species diversity could be linked to the use of pesticides. Thus our project wanted to establish the possible relationship.
Many studies have found that pesticides are toxic to most insects, vegetation structure and soil type. They are designed to kill, reduce or repel insects, weeds, rodents or other organisms that negatively affect crops. The use of pesticides which is due to pressure to improve agricultural produce, eventually changes the habitat and biodiversity.
Pesticides have beneficial effects such as crop protection and prevention of vector borne diseases. Most pesticides contain organophosphate and carbamate which affects grass eating insects . Commonly used herbicides contain sulfonamides , hexazinone and imidazolinones.

Materials:
The following was thought to be happening in the study areas exposed to pesticides:
Pesticides → targeted weeds/insects → Non targeted species affected → Food web/chain affected → reduced species/biodiversity
Experimental design was chosen to estitablish cause and effect relatiship.
Vegetable garden at school was selected as a control for the project since no pesticides were used. It was pure organic.
Another garden in the nearby village where same species of vegetables are cropped was also studied to see the difference. Two portions in the garden were named Community A, where insecticides were used and Community B, where herbicides were used.
Three communities were studied three times in the period of a month at the interval of ten days. No weeding was done throughout the period of study to avoid disturbing the growth of weeds.
In the three fields, quantitative ecology was undertaken to study the biodiversity which is the distribution and richness of species.

Procedure:
The wooden square quadrat was made with an area of $1m^2$..
The quadrat was thrown randomly over the field under study and species within it were counted wherever it falls. This was to study the small segments of the habitat to acquire species estimations.
Few species of interest present within the frame were determined and the numbers or abundance were recorded for study this was for simplicity. Rooted frequency was considered for weeds.
Procedure was repeated five times per Community and then the average number of species was calculated.
Shannon-Wiener Index was calculated using the free scale available at http://www.alyoung.com/labs/biodiversity_calculator.html

Results:
The study found that the organic garden was rich in species. It had higher values of population density and species diversity since almost all species of insects and weeds were common or abundant.
Results were different in comminity A and B where insecticides and herbicides were used respectively. In the community A there were more weeds. Weed species E and A were frequent rare while the rest were rare. All insects species were rare.
In the community B weed type A, B and D were occasional, while the rest were rare. However, insect species such as maggot and caterpillar were frequent while the rest were rare.
As results shows, in Control Community, there were both species abundances and richness while in Community A and B there were less species abundances as well as richness.

Insects estimated population

Studied Community	Maggot	bee tles	fly	ants	Caterpillar	bees	spider
Control community/Organic	772	231	142	69	823	16	194
Community A (Insecticide used)	02	05	00	09	00	00	01
Community B (Herbicides used)	02	00	00	00	01	00	02

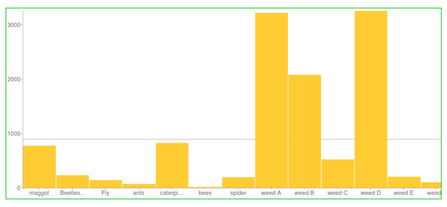

Figure 1: Control Community

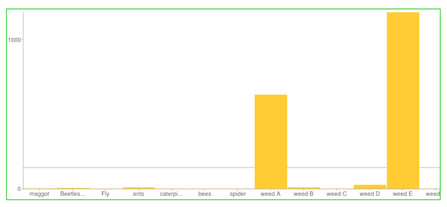

Fig 2. Community A (Insecticide used)

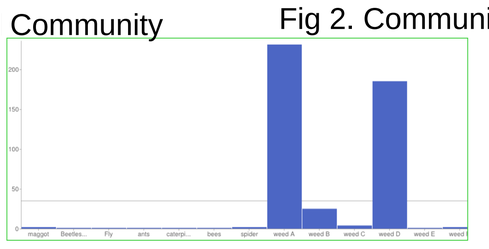

Fig 3. Community B (Herbicides used)

	Dataset Totals			Alpha Biodiversity		Beta Biodiversity	
	Total Number Organisms	Number of Species	Average Population size	Simpson Index	Shannon Index	Absolute beta Value	Number of common species
Control Community	11603	13	892.5	0.398	1.879	12	13
Community A (Insecticide used)	1869	13	143.8	1.02	0.81	12	7
Community B (Herbicides used)	457	13	35.15	0.84	1.063	12	5

Conclusions:
These results confirmed what we had predicted. Pesticides disturbed weed and insect species distribution in the study gardens. The study showed that insecticides not only reduce targeted insect species but they affect some species of weeds. This means that this type of pesticides disturbs the food chain or web of the habitat.
Also, the study indicated that herbicides reduces some type of weeds (targeted) and some insects. This may be suggests that pesticides affects ecosystems which eventually harms species. Our findings relates with other studies.
In recent study conducted in Italian agricultural area, researchers monitored species richness of wild bees, bumblebees and butterflies were sampled after pesticides application.

Further information:
Download at: www.youngscientists.co.tz/posters

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