Reading Guide for Rachel Carson, *Silent spring* / Drawings by Lois and Louis Darling. Boston: Houghton Mifflin, 1962.

Read: Chapter 6 (Earth's Green Mantle)

Core Question:
What impacts does manipulation of life bring?

Introduction:

→ The author: Rachel Carson
→ The book: an overview
→ The chapter
    # Example from text to illustrate harm of herbicides
    # The functions of "weeds"
    # Non-selective herbicides
→ Controversy and reflections
    # Opposition
    # Questions to think about

Rachel Louise Carson (1907 – 1964) was an American marine biologist and a writer. While she was the author of several bestsellers on natural history, her most well-known and influential work was *Silent Spring*, a book which concerns the irresponsible application of synthetic pesticides and its consequences. The book successfully raised public awareness to the detrimental effects of pesticides. It has even caught the attention of President Kennedy, who ordered an investigation into Carson's claims and eventually led to the banning of DDT (a pesticide commonly used in the 1940s and 1950s to curb the spread of malaria) in the US.[1]

Carson began the book by conjuring a desolate spring scene, a "silent spring" as suggested in the title, devoid of bird songs or any other sounds of life. As revealed gradually in later chapters, this disturbing image is the result of the indiscriminate use of pesticides, which has brought devastation to the environment and wildlife. In fact, more than half of the book is devoted to various cases of the misuse of pesticides to illustrate how these chemicals can cause ecological disasters and health issues. Many of the chemicals mentioned were insecticides, especially DDT and several other chemicals commonly used at that time. The selected reading, Chapter 6 of *Silent Spring*, is the only chapter with its discussion focused on herbicides. Citing numerous examples of harmful consequences of pesticide misuse, Carson calls for carefully-managed use of pesticides with more consideration for the natural balance

[1] "Silent Spring", *Wikipedia*, (21:53, 11 February 2010).

of the ecosystem.

At the beginning of the selected chapter, the author pointed out that plants play a major role in supporting life on Earth. At the bottom of the food chain, plants are vital in capturing energy from the sun and converting it to forms which can be utilized by other animals. Life can thrive in a wide range of landscapes, from mountains to plains, deserts to wetlands, supported by various types of plants suited to the particular conditions there. A "web of life" is formed through the course of evolution, as the author illustrated using the example of the sage land in Western United States. Adapted to the cold and dry climate, the evergreen sage was the principal food source for many animals during the long winters on the high plains. The plant, aside from providing energy, also holds moisture for the growth of grass and functions as shelter for the birds. However, the government then failed to recognize the importance of the sage and regarded it as "weeds" to be eliminated to give way to more grazing land for the cattlemen. The result of the spraying was the killing of not only the sage but also other plants nearby. Wildlife that has once depended on these plants dwindled, and the cattle also suffered as the grass couldn't grow well without the moisture-holding sage.

The above was merely one of many examples where man destroyed the balance of the ecosystem out of ignorance and ultimately brought harm to himself. The author stressed that many of the "weeds" are actually useful plants which functions man frequently overlook. The hedgerows, for instance, are home to many animals as well as food for insects. While we do not depend directly on these plants, our agriculture depends on pollinating insects which in turn live on the plants which seems useless to us. Reckless actions to eliminate the plants would ruin these relations and eventually backfire on man.

On the other hand, Carson urged readers to think twice before using herbicides. Due to their non-specific nature, herbicides indiscriminately kill off the targeted "weed" and other plants, sometimes even affecting the livestock and men. An alternative the author suggested is biological control. With the introduction of natural enemies which selectively target the "weed" in question, unwanted vegetation could be kept under control while other plants and animals remain unaffected.

Carson's book has been widely recognized since it came out in 1962. It was selected by the book-of-the-Month Club, and in 2006 it was listed as one of the 25 greatest science books of all time by *Discover Magazine*. While the book has won support from many, not all are convinced. Opponents argued that *Silent Spring*

inspired the ban on DDT and thus resulted in the increased toll of malaria in poor countries. Criticisms were also directed at claims in the book that DDT caused cancers in humans. Critics maintained that scientific researches on health implications of DDT had been inconclusive, and they believed that many examples of health issues listed in the book were not necessarily related with exposure to pesticides. As readers without professional knowledge in the specific field, we could find it difficult to decide if the claims are valid.[2] When both sides based their claims on scientific researches, how would you make your choice? If we take the vested interests of pesticides manufacturers and chemical researchers into consideration, would it change your decision?

Controversies aside, this book has prompted us to ask important questions about humans and our relationship with nature. How much do we know about it? Could we control it? How do we make use of it while ensuring that future generations can still enjoy the same abundant resources? What should our role be in nature?

Suggested Outline of the text

Paragraphs 1-2: Introduction: humans' ignorance and arrogance.
Paragraphs 3-15: Example of sage eradication program by spraying herbicide
- 3-9: Interdependence between the sagebrush and other life forms as a result of evolution.
- 10-11: The eradication
- 12-15: Effects of eradication by spraying

Paragraphs 16-17: Current situation of herbicide usage
Paragraphs 18-24: The price of spraying
Paragraphs 25-27: The attitudes of herbicide sellers and federal field men towards spraying
Paragraphs 28-30: The role of natural vegetation in nature
Paragraphs 31-32: Shortcomings of herbicides
Paragraphs 33-37: Alternative method – selective spraying
Paragraphs 38-42: The adverse effects of common herbicides
Paragraphs 43-46: The functions of weeds
Paragraphs 47-48: Chemical control may be ineffective

[2] Carson's conjecture is controversial. There are opinions from both sides. In his article "Silent Spring at 40: Rachel Carson's classic is not aging well" (http://reason.com/archives/2002/06/12/silent-spring-at-40), Ronald Bailey strongly criticizes Carson's conjecture. Keith Lockitch holds a similar position in "Rachel Carson's Genocide" (http://capmag.com/article.asp?ID=4965) while Kirsten Weir shows a more balanced point of view in "Rachel Carson's birthday bashing" (http://www.salon.com/news/feature/2007/06/29/rachel_carson/).

Paragraphs 49-59: Alternative method – biological control

53-57: The example of the Klamath weed

58-59: The example of prickly pears

Paragraph 60: Conclusion

Study Questions
(Answers can be found at the end of this section.)

(Para. 1-2: Introduction: humans' ignorance and arrogance.)

True or False:

1. The author thinks that humans should not interfere with any of the relations between life and the earth.

(Para. 3-10: Interdependence between the sagebrush and other life forms as a result of evolution)

2. Which factor enables sage to survive the long ages of natural selection in the dry West?

(a) The roots of sage absorb nutrients effectively.

(b) There is good sunlight in the dry West.

(c) The small grey leaves of sage can hold moisture.

(d) The grouse provides food for it.

3. What animals depend on the sage?

I. Grouse

II. Antelope

III. Mule deer

(a) I only. (b) III only. (c) II and III only. (d) I, II and III.

4. Why did the land management agencies decide to eliminate the sage?

(a) To provide more farming fields.

(b) To satisfy the demand for grazing land.

(c) To protect the antelope from the harsh climate.

(d) To maintain the balance of the ecosystem.

(Para. 12-15: Effects of eradication by spraying)

5. What was the immediate side effect of spraying on sagebrush, as illustrated in the example of the Bridger National Forest?

(a) The lake drained away.

(b) The beavers disappeared.

(c) The waterfowl disappeared.

(d) The willows were killed.

6. Refer to the last question. What were the subsequent side effects of spraying on sagebrush, as illustrated in the example of the Bridger National Forest?

I. The beavers disappeared.

II. The waterfowl disappeared.

III. The lake drained away.

IV. The willows were killed.

(a) I and II only. (b) I and III only. (c) II and III only. (d) I, II, and III.

(Para. 18-24: The price of spraying)

7. What was the negative consequence of using sprays?

(a) The tourists made negative comments to the place.

(b) More money had to be spent on advertising.

(c) Crop yields decreased.

(d) Spray manufacturers earned less.

(Para. 28-30: The role of natural vegetation in nature)

8. Which of the following are the functions of roadside vegetation?

I. Providing food for birds.

II. Providing food for pollinating insects.

III. Providing nesting areas for birds.

IV. Promoting tourism.

(a) I and II only. (b) II and III only. (c) III and IV only. (d) I, II and III only.

(Para. 33-37: Selective spraying)

9. Selective spraying can achieve a long-term control of tree growth based on the fact that

(a) the grasses are highly resistant to the invasion by trees.

(b) the herbicide prevents the growth of all plants.

(c) the shrubs are highly resistant to the invasion by trees.

(d) the herbicide harms the trees only.

10. Which of the following are the advantages of selective spraying?
I. The natural beauty is preserved.
II. The effect of a single spraying can last longer.
III. It reduces potential harm to wildlife.
(a) II and III only. (b) I and III only. (c) I and II only. (d) I, II and III.

(Para. 38-42: The adverse effects of common herbicides)
11. Why are the plants sprayed with "2,4-D" (a herbicide) dangerous for cattle?
(a) They cause genetic diseases in the cattle.
(b) The cattle will suffer from the lack of oxygen after consuming these plants.
(c) The cattle will become crazy after consuming these plants.
(d) They cause heart diseases in the cattle.

(Para. 43-46: The functions of weeds)

	First statement	**Second statement**	
(a)	True	True	The 2nd statement is a correct explanation of the 1st statement.
(b)	True	True	The 2nd statement is NOT a correct explanation of the 1st statement.
(c)	True	False	
(d)	False	True	

12. Roses grow better with marigolds than growing alone.	An excretion released by marigolds kills nematodes in the soil.	

13. What are the functions of the plants which are considered as weeds?
I. The weeds and the soil mutually benefit each other.
II. The weeds indicate the condition of soil.
III. To satisfy the need to preserve some plant communities.
(a) I and III only. (b) I and II only. (c) II and III only. (d) I, II and III.

(Para. 47: Chemical control may be ineffective)
True or False
14. After the spraying of "2,4-D", the grasses have become "weeds" because there are less plants to compete with them.

(Para. 48-49: Unsuccessful examples on blanket spraying)
15. Which of the following is/are the reason(s) that blanket spraying results in more ragweed?
I. The chemicals enhance the growth of ragweed.
II. The chemicals increase the pollen content in the atmosphere.
III. The chemicals kill the protective vegetation, making it easier for the weeds to invade.
(a) I only. (b) III only. (c) I, and II only. (d) II, and III only.

(Para. 53-57: biological control - Klamath weed)
16. According to the text, which area was affected by Klamath weed?
I. California
II. Europe
III. Australia
(a) I only. (b) II only. (c) I and II only. (d) II and III only.

17. What was brought to control the growth of Klamath weed?
(a) Moth (b) Virus (c) Beetle (d) Worm

Answers:

1.F	6.d	11.b	16.a
2.c	7.a	12.a	17.c
3.d	8.d	13.d	
4.b	9.c	14.T	
5.d	10.d	15.b	

- End -