

**Odds and Ends.**

Our lives are full of odds and ends,  
First one and then another;  
And, though we know not how or when,  
They're deftly wove together.

The weaver has a master's skill,  
And proves it by this token:  
No loop is dropped, no strand is missed,  
And not a thread is broken.

And not a shred is thrown aside,  
So careful is the weaver,  
Who, joining them with wondrous skill,  
Weaves odds and ends together.

**LECTURES ON  
Chemical Fertilizers**  
DELIVERED BY PROF. GEO. VILLE  
AT THE EXPERIMENTAL  
FARM, VINCENTNES,  
FRANCE.  
FURNISHED BY JACK & BELL, HALIFAX

**GENTLEMEN:** In our first meeting I endeavored to show you the nature of the elements composing vegetation. You remember that these elements are very unequally distributed in the different organs, or rather between those forming ephemeral combinations before passing into the state of tissues or organs.

To complete this almost preliminary study we must now ask in what state we find these elements of nature, the source and cause of fertility of soil, under what form plants assert them, and to what degree we can, by their aid, act upon the products of vegetation.

I begin with carbon. The quantity of carbon which enters into the composition of plants is, in round numbers, from 40 to 45 per cent. Carbon, then, plays a prominent part in vegetation. If, however, I add that in agriculture it is not necessary—that it may be entirely excluded from manures without affecting the fertility of the soil—I will appear to contradict myself.

The contradiction is, but apparent and to prove it, permit me to remind you that the carbon of plants has its origin in the carbonic acid of the air, and the atmosphere is an inexhaustible source to it. I need not, therefore, repeat of the assimilation of carbon; in many respects this omission will not be inconvenient; nevertheless I have determined to stop here and make this the object of a deep study. Why? For two reasons—because the explanation of this phenomena marks an era in the history of science, but particularly because its study will help us to show clearly the essential characteristics of vegetable productions.

The act which determines the assimilation of carbon is a simple phenomenon. Carbonic acid, formed from carbon and oxygen, being freed, returns to the atmosphere. Here is produced a truly extraordinary phenomenon and one which we cannot imitate in our laboratories without calling to our aid the most powerful means of analysis at the disposal of chemistry; this phenomenon the delicate tissue of the leaf performs without effecting its organization.

You will see, farther, that vegetable respiration produces effects opposite to animal respiration. Plants borrow carbonic acid from the air and return oxygen to it, while animals, who borrow oxygen return carbonic acid. This explains the reason why the composition of the atmosphere is not changed by the incessant drain made on it by plants and animals.

Under this continued though unseen conflict there is an order of phenomena still more profound and mysterious, which I would like to show you, because to my eyes there is nothing more fit to unveil to you the true character of agricultural products, and to show you how this grand act of vegetable life, to which are most intimately joined the most essential conditions of our existence, differs from all other products of human activity.

**General Rule.**  
All work of production presuppose two equally indispensable things—a first cause and a source of force.

Without these two conditions nothing can be produced.

Whatever we do, the material in use experiences diminution which we strive to prevent, but cannot entirely avoid. The same in regard to the force expended. We make use of but a part of it—the rest is unavoidably lost. I repeat then, the product, which is the

material representative of the work is unequal to the first cause and the source employed. Take, for example, any industrial labor you will—metallurgy, weaving, the mechanical arts. The work is always accompanied by a double loss of the first material and vital force, produced by friction of intermediate organs and imperfection of apparatus.

In agriculture the character of the production is different. The earth, through its harvests, returns ten times the value of what we give her by our fertilizers, and every harvest supposes an expenditure of force at least five hundred times greater than the sum of the efforts which produced it.

How can we explain these two opposing facts? The economy of the assimilation of carbon will teach us.

All vegetables, as we have said, contain from 40 to 45 per cent. of their weight of carbon. Now, if the carbon comes from the air and is added to the agents which we give the earth to fertilize it, we immediately perceive why the earth gives more than she has received. It is the same with regard to oxygen and hydrogen, which represent more than 50 per cent. the weight of vegetable matter and which are given out by water.

For this, then, it follows that 95 per cent. of vegetable matter is provided by sources different from the soil, and that the amount furnished the soil by human industry is but a fraction of the harvest we draw from it. But this fraction is indispensable, for without it the carbon of the atmosphere, the oxygen of the water, would remain in their primitive state in the domain of inorganic matter, and could not have entered the current of vegetable life. You know now why the earth gives more than it receives. The excess comes from the air and the rain.

The following table is an undeniable demonstration of the fact. It is understood that what I say of wheat is equally applicable to other plants.

Composition of Wheat (Straw and Grain).

Carbon	47.69	Here 93.55
Hydrogen	5.54	come from the
Oxygen	40.32	air and rain
Soda	0.09	Here 3.386
Magnesia	0.20	with which the
Sulphuric Acid	0.31	soil is abund-
Chlorine	0.03	antly supplied,
Oxide of Iron	0.0006	and which we
Silica	2.75	need not give
Manganese	?	to it.
Azote	1.60	Here 3.00 with
Phosphoric Acid	0.45	which the soil
Potash	0.66	is but poorly
Lime	0.29	provided, and
		we must give to
		it by manures.
	99.93	

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Etna, Sept. 20th.

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Time Table**

1884—Summer Arrangement—1884.

Commencing Monday, 2nd June.

GOING EAST.	Accm. Daily.	Accm. T.T.S.		Exp. Daily.
		A. M.	P. M.	
Annapolis Leve		5 30	1 45	
14 Bridgetown "		6 25	2 23	
28 Middleton "		7 25	2 57	
42 Aylesford "		8 32	3 30	
47 Berwick "		8 55	3 43	
30 Waterville "		9 10	3 50	
59 Kentville d'pt	5 40	10 40	4 20	
64 Port Williams "	6 00	11 00	4 35	
66 Wolfville "	6 10	11 10	4 38	
68 Grand Pre "	6 25	11 22	4 46	
69 Avonport "	6 37	11 35	4 54	
72 Hantsport "	6 55	11 55	5 08	
84 Windsor "	7 45	12 45	5 30	
116 Windsor June "	10 00	3 10	6 50	
130 Halifax arrive	10 45	3 55	7 25	

GOING WEST.	Exp. Daily.	Accm. M.W.F.		Accm. daily.
		A. M.	P. M.	
Halifax—leave	7 20		2 30	
14 Windsor Jun—"	8 00	8 30	3 30	
46 Windsor "	9 15	11 00	5 35	
53 Hantsport "	9 35	11 30	6 03	
58 Avonport "	9 48	11 50	6 20	
61 Grand Pre "	9 56	12 06	6 33	
64 Wolfville "	10 05	12 24	6 46	
66 Port Williams "	10 10	12 38	6 55	
71 Kentville "	10 40	1 25	7 10	
80 Waterville "	10 58	2 02		
83 Berwick "	11 05	2 17		
88 Aylesford "	11 18	2 40		
102 Middleton "	11 48	3 47		
116 Bridgetown "	12 23	4 52		
130 Annapolis Ar've	1 00	5 50		

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P. Innes,  
General Manager.  
Ker. ville, 1st Sept. 1884

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