# Economic Impact of Banning Methyl Bromide

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Methyl bromide (MB) is an agricultural fumigant that controls nematodes, weeds, fungi and other soilborne pathogens. China has been both a consumer and a producer of MB for more than 45 years. Initially MB was used only for the fumigation of cotton seed, perishables and for quarantine purpose in China. With the reform and the development of agriculture economy, the growers found that the soil-borne diseases and nematodes became more and more serious than ever. Since 1980's, many soil fumigation experiments have been conducted on tobacco seedbeds, tomato and cucumber in plastic tunnels, and strawberry. All the experiments have gained good results and significant profit, especially with the release of tinned MB (681g) to market in 1995. The consumption of MB has been increased significantly since then.

It is, however, recognized that MB contributes significantly to ozone depletion. As a consequence many countries, including China, are currently restricting consumption and production in order to face an eventual phase out of MB for use in agriculture. Therefore, while MB use is booming in agricultural production, China is going to meet the requirement of phasing out MB according to the Montreal Protocol. At present, in China, more than 95% of the MB used for soil fumigation is dedicated to four crops: tobacco seedlings, strawberries, vegetables (mainly tomato, cucmber and pepper) and medical herbs (mainly ginseng). Fortunately, the alternatives (mainly floating tray) to MB for soil fumigation in tobacco seedlings have been developed well and worked as well as MB without increase in the cost of input. But for other products, there are still not effective alternatives.

This article is aimed at evaluating the economic impact of banning methyl bromide on the production of vegetable, strawberries and medical hers (mainly ginseng) in China by developing a two-stage model. The first stage is to maximize the production of each crop that use methyl bromide, given the prices of methyl bromide and of its substitutes, subjecting to budget constraint. The second stage is to maximize the total output of all the three crops, given the maximized production of each crop, subjecting to all the required constraints. The evaluation is done in three scenarios differing in the quantity of reducing MB use after 2005. This article points out that China's total net present value of the loss incurred from 2003 to 2015 is about 10 billion Chinese Yuan (1 US$ = 8.277 Yuan).

## I. Introduction

China is both a consumer and a producer of methyl bromide (MB) and has used it and produced it for more than 45 years. Initially MB was used only for the fumigation of cotton seed, perishables and for quarantine purpose. With the reform and the development of agriculture economy, the growers found that the soil-borne diseases and nematodes became more and more serious than ever. Since 1980's, many soil fumigation experiments have been conducted on tobacco seedbeds, tomato and cucumber in plastic tunnels, and strawberry. All the experiments have gained good results and significant profit, especially with the release of tinned MB (681g) to market in 1995. The farmers mastered the technique very quickly. The consumption of MB has been increased significantly since then.

It is, however, recognized that MB contributes significantly to ozone depletion. As a

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consequence many countries are currently restricting consumption and production in order to face an eventual phase out of MB for use in agriculture. The reduction of MB is an essential step that the countries can take towards overcoming one of the most serious problems contributing to environmental degradation. China was among the first countries in questing international assistant to conduct demonstration trials of alternatives for soil fumigation.

The Vienna Convention for the Protection of the Ozone Layer (1985) and the subsequent Montreal Protocol (1990) have formed the basis for global, multilateral cooperation to deal with the problem. The Multilateral Fund for the Implementation of the Montreal Protocol (MFMP) has been set up to help developing countries, which have fewer resources (Article 5 Countries), to cover the costs for phasing-out ozone-depleting substances (ODS).

The Parties to the Montreal Protocol in the 9th Meeting held in Montreal in 1997 (Montreal Amendment), for countries operating under Article 5, agreed that:

- From 1st January 2002, the production and consumption of MB will be frozen at the average consumption level for 1995-1998 (Base-line).
- From 1st January 2005, the production and consumption of MB will be reduced in 20%, based on the average levels for 1995-1998 (Base-line).
- In 2003, decisions would be taken on further reductions on MB for the period 2005 and beyond.
- From 1st January 2015, complete MB phase-out.
- MB used for quarantine and pre-shipment (QPS) purposes is exempted from the agreements.

While the use of MB is booming in agricultural production, China is going to meet the requirement of phasing out MB according to the Montreal Protocol. This kind of restriction will inevitable harm producers. In China more than 95% of the MB used for soil fumigation is dedicated to four crops: tobacco seedlings, strawberries, vegetables (mainly tomato, cucmber and pepper) and medical herbs (mainly ginseng). Fortunately, the alternatives (mainly floating tray) to MB for soil fumigation in tobacco seedlings have been developed well and worked as well as MB without increase in the cost of input. Therefore, there will be less economic impact of banning MB on the production of tobacco. But for other products, there are still not effective alternatives. In this case, it is necessary to evaluate the economic impacts of banning MB on the production of the other three crops.

## II. Theoretical Structure

The methodology to evaluate the impact of banning methyl bromide is to maximize the total production of crops, which use methyl bromide, by adjusting cultivated area and use of substitutes of methyl bromide, subjecting to various constraints.

### II.1. Production model for each product

The problem to solve is to maximize the production of each crop that use methyl bromide, given the prices of methyl bromide and of its substitutes, subjecting to budget constraint.

$$F_i(v, w_i, E) = \underset{m_i, s_i}{Max}\ f_i(m_i, s_i) \qquad (1.1)$$

$$\text{s.t.} \quad vm_i + w_i s_i = E_i \qquad (1.2)$$

where:

i: the $i^{th}$ crop

$f_i(m_i, s_i)$: production of the $i^{th}$ crop per mu

v: market price of methyl bromide (Yuan/mt)

$m_i$: quantity of methyl bromide used by the $i^{th}$ crop (mt/ha)

$w_i$: composite price of the inputs other than of methyl bromide used by the $i^{th}$ crop (Yuan/ha)

$s_i$: composite quantity of the inputs other than methyl bromide used by the $i^{th}$ crop (mt/ha)

$E_i$: total cost of the $i^{th}$ crop in its production (Yuan)

Here, for the seek of simplification, we assume that 1) the prices of methyl bromide used in all crops are the same, 2) all the inputs into the production of each crop other than methyl bromide are considered as one composite input with one composite price, 3) the production of each crop is the function of quantity of methyl bromide used and composite quantity of the inputs used other than methyl bromide. Further, we assume the function is Cobb-Douglas:

$$f_i(m_i, s_i) = B_i m_i^{a_i} s_i^{b_i} \qquad (1.3)$$

Thus, the problem can be reduced to be

$$\underset{m_i, s_i}{Max}\, a_i \ln m_i + b_i \ln s_i \qquad (1.4)$$

s.t $vm_i + w_i s_i = E_i$

FOC:

$$\frac{\partial L}{\partial m_i} = \frac{a_i}{m_i} - l v = 0 \qquad (1.5)$$

$$\frac{\partial L}{\partial s_i} = \frac{b_i}{s_i} - l w_i = 0 \qquad (1.6)$$

$vm_i + w_i s_i = E_i$

Dividing (1.5) by (1.6), we have

$$\frac{a_i}{b_i} = \frac{v m_i}{w_i s_i}$$

That is, the ration of $\alpha_i$ to $\beta_i$ equals the ration of the expenditure of methyl bromide to that of other inputs. Furthermore, we assume that $\alpha_i + \beta_i = 1$, i.e., constant return to scale. Thus, $\alpha_i$ is the share of the expenditure of methyl bromide and $\beta_i$ is the share of the expenditure of other inputs.

From FOC, we get:

$m_i(v, w_i, E_i) = \alpha_i E_i / v$,

$s_i(v, w_i, E_i) = \beta_i E_i / w_i$,

$$F_i(v, w_i, E_i) = B_i E_i \left(\frac{a_i}{v}\right)^{a_i} \left(\frac{b_i}{w_i}\right)^{b_i} .$$

**II.2. Total production model**

For the total production of all crops that use methyl bromide, the problem is to maximize the total output of all crops that use methyl bromide, given the maximized production of each crop, subjecting to all the required constraints.

$$\pi(M, E1, E2, \ldots, p_i, w_1, w_2, \ldots) = \underset{v, A_i}{Max} \sum_i p_i F_i(v, w_i, E_i) A_i \qquad (2.1)$$

s.t.

$A_i \geq 0$; (2.2)

$M \geq \Sigma_i m_i A_i$; (2.3)

$m_i = \alpha_i E_i / v$. (2.4)

where:

$p_i$: market price of the $i^{th}$ crop (Yuan/mt)

$A_i$: total cultivated area of the $i^{th}$ crop (ha)

M: total quantity of methyl bromide used (mt)

In terms of the form of function $F_i(v, w_i, E)$, the problem can be reduced to be:

$$\underset{v, A_i}{Max} \sum_i (-a_i \ln v - b_i \ln w_i + \ln A_i) \qquad (2.5)$$

s.t.

$A_i \geq 0$;

$M \geq \Sigma_i m_i A_i$;

$m_i = \alpha_i E_i / v$.

The augmented objective function is

$L = \Sigma_i (-\alpha_i \ln v - \beta_i \ln w_i + \ln A_i) + \Sigma_i \lambda_i Ai + \gamma(M - \Sigma_i (\alpha_i E_i / v) A_i)$

FOC:

$\gamma = (\Sigma_i \alpha_i)/M$ (2.6)

$\lambda_i = 0$, $(Ai > 0)$

$\gamma = v/(A_i \alpha_i E_i)$ (2.7)

$M = \Sigma_i m_i A_i$;

$m_i = \alpha_i E_i / v$.

$\gamma$ is the shadow price of methyl bromide used in the crops, it is equal to the increase in total production derived from a relaxation of the corresponding constraint, that is, from a marginal increase in the available quantity of methyl bromide. From (2.6) and (2.7), we have

$$\mathbf{M} = \frac{A_i E_i a_i \sum_i a_i}{v} \qquad (2.8)$$

(2.8) gives us the relation of total quantity of methyl bromide, M, total cultivated area of the $i^{th}$ crop, $A_i$, market price of methyl bromide, v, total cost of the $i^{th}$ crop in its production, $E_i$, the share of the expenditure of methyl bromide used in the $i^{th}$ crop, $\alpha_i$, and the summation of the shares $\Sigma_i \alpha_i$.

## III. Database and the scenarios of phasing out MB

### III.1 Database

It is estimated that the production of strawberries, vegetables (mainly tomato, cucmber and pepper) and medical herbs (mainly ginseng) will increase rapidly in China in order to meet the

increasing demand in the period of 2002-2015. While the productions of the three crops expand, the allocation of various inputs into the production will be subject to be adjusted. Based on the history data and in line with the path of expansion, we have the estimation of the cultivated areas and the input costs of the three crops.

**Table 3.1. Estimation of the cultivated areas and input costs of vegetable, strawberries and medical herbs (1 Mu = 1/15 Ha)**

| | Areas (Ha) | | | Input cost (Yuan/Mu) | | |
|---|---|---|---|---|---|---|
| Year | Vegetable | strawberries | medical herbs | Vegetable | strawberries | medical herbs |
| 2002 | 1440 | 1125 | 333 | 6207 | 3030 | 10100 |
| 2003 | 2300 | 1350 | 1000 | 6249 | 3060 | 10201 |
| 2004 | 3690 | 1620 | 2000 | 6292 | 3091 | 10303 |
| 2005 | 5530 | 1944 | 3000 | 6334 | 3122 | 10406 |
| 2006 | 7740 | 2294 | 3300 | 6377 | 3153 | 10510 |
| 2007 | 10060 | 2707 | 3366 | 6420 | 3185 | 10615 |
| 2008 | 12080 | 3140 | 3433 | 6464 | 3216 | 10721 |
| 2009 | 13280 | 3642 | 3502 | 6507 | 3249 | 10829 |
| 2010 | 14610 | 4189 | 3572 | 6552 | 3281 | 10937 |
| 2011 | 16070 | 4733 | 3643 | 6596 | 3314 | 11046 |
| 2012 | 17680 | 5348 | 3716 | 6641 | 3347 | 11157 |
| 2013 | 19450 | 5990 | 3791 | 6685 | 3380 | 11268 |
| 2014 | 21390 | 6709 | 3866 | 6731 | 3414 | 11381 |
| 2015 | 23530 | 7380 | 3944 | 6776 | 3448 | 11495 |

Without considering the phasing-out of MB, we estimate the quantities of MB demanded by the production of the three crops in the future in line with the trend of expansion (Table 3.2). Meanwhile, we assume that the price of MB will be fixed at 17 Yuan per tin (0.681 g). By formula (2.8), we get the share of the expenditure of MB in total cost.

**Table 3.2. Estimation of MB used in the production of vegetable, strawberries and medical herbs, and of share of the expenditure of MB in total cost of each crop**

| | Quantity of MB (mt) | | | | Share of MB cost | | |
|---|---|---|---|---|---|---|---|
| Year | Vegetable | strawberries | medical herbs | Total | Vegetable | strawberries | medical herbs |
| 2002 | 738 | 576 | 171 | 1485 | 0.370629 | 0.526233 | 0.288425 |
| 2003 | 1152 | 675 | 500 | 2327 | 0.365214 | 0.513119 | 0.281427 |
| 2004 | 1843 | 810 | 1000 | 3653 | 0.363491 | 0.506480 | 0.277974 |
| 2005 | 2765 | 972 | 1500 | 5237 | 0.362431 | 0.499927 | 0.274563 |
| 2006 | 3871 | 1147 | 1650 | 6668 | 0.361258 | 0.493450 | 0.271194 |
| 2007 | 5032 | 1353 | 1683 | 8068 | 0.360077 | 0.487058 | 0.267867 |
| 2008 | 6038 | 1570 | 1717 | 9325 | 0.358746 | 0.480766 | 0.264580 |
| 2009 | 6642 | 1821 | 1751 | 10214 | 0.357646 | 0.474571 | 0.261333 |
| 2010 | 7306 | 2094 | 1786 | 11187 | 0.356418 | 0.468392 | 0.258127 |

**III.2. Scenarios of phasing-out**

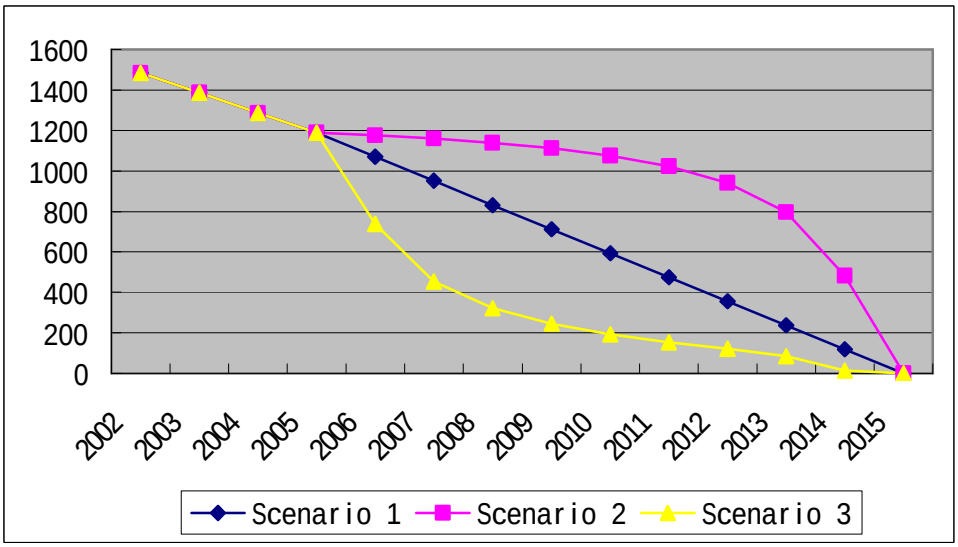
In terms of the Montreal Protocol, we design three scenarios for phasing out MB used in the production of these three crops. In these scenarios, the total quantity of MB used in the production of the three crops from 2002 to 2005 is reduced in terms of the Protocol. The difference among the three scenarios is the rationed use of MB after 2005 (Figure 3.1).

In scenario 1, MB use will be reduced equally in each year until being zero in 2015.

In scenario 2, MB use will be reduced at the speed from low to high with a constant acceleration until being zero in 2015.

In scenario 3, MB use will be reduced at the speed from high to low with a constant acceleration until being zero in 2015.

**Figure 3.1. Three scenarios of phasing out MB**




After total quantity of MB used in each scenario is determined, it will be allocated into the production of three crops in each scenario by the following rules:

1) To allocate total quantity of MB in 2002 among the three crops according to the share of MB used in the production of the three crops in 2001.
2) After that, to reduce the quantity of MB used in the production of vegetable by the quantity equal to the total quantity of MB reduced at the same year until being zero, keeping the quantity of MB used in other two crops unchanged.
3) Then, to reduce the quantity of MB used in the production of strawberries by the quantity equal to the total quantity of MB reduced at the same year until being zero, keeping the quantity of MB used in medical herbs unchanged.
4) Then, to reduce the quantity of MB used in the production of medical herbs by the quantity equal to the total quantity of MB reduced at the same year until being zero.

**Table 3.3. The quantity of MB used in vegetable, strawberries and medical herbs from 2002 to 2015 in scenario 1**

| Year | Total | Vegetable | strawberries | medical herbs |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 2002 | 1485 | 738 | 576 | 171 |
| 2003 | 1386 | 639 | 576 | 171 |
| 2004 | 1287 | 540 | 576 | 171 |
| 2005 | 1188 | 441 | 576 | 171 |
| 2006 | 1069 | 322 | 576 | 171 |
| 2007 | 950 | 203 | 576 | 171 |
| 2008 | 832 | 84 | 576 | 171 |
| 2009 | 713 | 0 | 542 | 171 |
| 2010 | 594 | 0 | 423 | 171 |
| 2011 | 475 | 0 | 304 | 171 |
| 2012 | 356 | 0 | 186 | 171 |
| 2013 | 238 | 0 | 67 | 171 |
| 2014 | 119 | 0 | 0 | 119 |
| 2015 | 0 | 0 | 0 | 0 |

**Table 3.4. The quantity of MB used in vegetable, strawberries and medical herbs from 2002 to 2015 in scenario 2**

| Year | Total | Vegetable | strawberries | medical herbs |
|---|---|---|---|---|
| 2002 | 1485 | 738 | 576 | 171 |
| 2003 | 1386 | 639 | 576 | 171 |
| 2004 | 1287 | 540 | 576 | 171 |
| 2005 | 1188 | 441 | 576 | 171 |
| 2006 | 1175 | 428 | 576 | 171 |
| 2007 | 1159 | 411 | 576 | 171 |
| 2008 | 1138 | 391 | 576 | 171 |
| 2009 | 1111 | 364 | 576 | 171 |
| 2010 | 1075 | 328 | 576 | 171 |
| 2011 | 1023 | 275 | 576 | 171 |
| 2012 | 941 | 194 | 576 | 171 |
| 2013 | 796 | 49 | 576 | 171 |
| 2014 | 483 | 0 | 312 | 171 |
| 2015 | 0 | 0 | 0 | 0 |

**Table 3.5. The quantity of MB used in vegetable, strawberries and medical herbs from 2002 to 2015 in scenario 3**

| Year | Total | Vegetable | strawberries | medical herbs |
|---|---|---|---|---|
| 2002 | 1485 | 738 | 576 | 171 |
| 2003 | 1386 | 639 | 576 | 171 |
| 2004 | 1287 | 540 | 576 | 171 |
| 2005 | 1188 | 441 | 576 | 171 |
| 2006 | 738 | 0 | 568 | 171 |

| | | | | |
|---|---|---|---|---|
| 2007 | 453 | 0 | 283 | 171 |
| 2008 | 321 | 0 | 150 | 171 |
| 2009 | 244 | 0 | 73 | 171 |
| 2010 | 193 | 0 | 22 | 171 |
| 2011 | 154 | 0 | 0 | 154 |
| 2012 | 120 | 0 | 0 | 120 |
| 2013 | 83 | 0 | 0 | 83 |
| 2014 | 12 | 0 | 0 | 12 |
| 2015 | 0 | 0 | 0 | 0 |

## IV. Economic loss incurred by phasing out MB

To evaluate the economic impact of phasing out MB on the production of the three crops based on the scenarios given above, attentions should be given on:

1) Farmers' behaviors in response to the anticipated the restriction of MB use in agricultural production. Here, we assume that farmers' behaviors are rational. They are able to adjust production structure, production mode and factor inputs to maximize their profits. These assumptions are also required by the model developed in II.1 and II.2.
2) Given the assumption that farmers are able to adjust production structure, production mode and factor inputs, the economic loss of rationing MB use mainly come from two resources: unreachable scale of economy which would be reached without restioned use of MB, and decrease in the production efficiency brought by the restricted use of MB. Obviously, the former is implicit, and the latter is explicit. Both the costs should be embodied in the evaluation of economic impact.

Therefore, the shortage of MB due to the restriction is: the quantity of MB that would be used (table 3.2, the quantity after 2010 is fixed at that in 2010) – rationed quantity of MB (table 3.3, 3.4 and 3.5). Then, we can calculate the reduction of planting area due to the restricted use of MB by formula (2.8).

**Table 4.1. The reduction of planting area of vegetable, strawberries and medical herbs due to the restrictied use of MB (Ha)**

| | Scenario 1 | | | Scenario 2 | | | Scenario 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Vegetable | Straw-berries | medical herbs | Vegetable | Straw-berries | medical herbs | Vegetable | Straw-berries | medical herbs |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 1025 | 197 | 658 | 1025 | 197 | 658 | 1025 | 197 | 658 |
| 2004 | 2609 | 467 | 1658 | 2609 | 467 | 1658 | 2609 | 467 | 1658 |
| 2005 | 4648 | 791 | 2658 | 4648 | 791 | 2658 | 4648 | 791 | 2658 |
| 2006 | 7096 | 1141 | 2958 | 6885 | 1141 | 2958 | 7740 | 1159 | 2958 |
| 2007 | 9654 | 1554 | 3024 | 9237 | 1554 | 3024 | 10060 | 2142 | 3024 |
| 2008 | 11911 | 1987 | 3092 | 11298 | 1987 | 3092 | 12080 | 2840 | 3092 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2009 | 13280 | 2558 | 3160 | 12552 | 2489 | 3160 | 13280 | 3496 | 3160 |
| 2010 | 14610 | 3343 | 3230 | 13955 | 3036 | 3230 | 14610 | 4145 | 3230 |
| 2011 | 14512 | 3488 | 3152 | 13965 | 2958 | 3152 | 14512 | 4081 | 3184 |
| 2012 | 14414 | 3624 | 3075 | 14032 | 2882 | 3075 | 14414 | 3976 | 3171 |
| 2013 | 14317 | 3751 | 3000 | 14221 | 2808 | 3000 | 14317 | 3874 | 3163 |
| 2014 | 14221 | 3775 | 3021 | 14221 | 3212 | 2927 | 14221 | 3775 | 3215 |
| 2015 | 14126 | 3677 | 3157 | 14126 | 3677 | 3157 | 14126 | 3677 | 3157 |

The survey data collected from 287 households of 47 villages in Tonghua (Jilin), Donggang (Liaoning), Jinan, Qingzhou, Linyi (Shangdong), Mangchen, Shunping, Yixian, Anguo (Hebei), shows that, averagely, farmers can get more profit from agricultural production by using MB than alternatives. The differences are 35279 Yuan/Ha in vegetable production, 43609 Yuan/Ha in strawberries, 450000 Yuan/Ha in medical herbs.

With all the data required, the economic loss incurred by the restricted use of MB in the three crops in three scenarios can be estimated separately. The net present value of loss after 2002 is calculated by discounting the loss in that year with 6% of discount rate. Table 4.2 shows that the loss increases yearly. The economic impact of banning MB use on medical herbs production will be shown with 5 years delayed because of the duration of ginseng growth, which is the main component of medical herbs in this study, is usually 5 years.

**Table 4.2. Economic loss incurred by banning MB used in the production of vegetable, strawberries, medical herbs (10,000 Yuan)**

| | Vegetable | | | Strawberries | | | Medical Herbs | | |
|---|---|---|---|---|---|---|---|---|---|
| | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 1 | Scenario 2 | Scenario 3 |
| NPV in 2002 | 297375 | 288929 | 300665 | 79344 | 71746 | 91532 | 609740 | 609740 | 610426 |
| 2003 | 3615 | 3615 | 3615 | 860 | 860 | 860 | 0 | 0 | 0 |
| 2004 | 9205 | 9205 | 9205 | 2037 | 2037 | 2037 | 0 | 0 | 0 |
| 2005 | 16399 | 16399 | 16399 | 3450 | 3450 | 3450 | 0 | 0 | 0 |
| 2006 | 25034 | 24289 | 27306 | 4976 | 4976 | 5053 | 0 | 0 | 0 |
| 2007 | 34057 | 32589 | 35491 | 6777 | 6777 | 9341 | 29629 | 29629 | 29629 |
| 2008 | 42021 | 39858 | 42617 | 8666 | 8666 | 12386 | 74629 | 74629 | 74629 |
| 2009 | 46851 | 44282 | 46851 | 11155 | 10855 | 15244 | 119629 | 119629 | 119629 |
| 2010 | 51543 | 49231 | 51543 | 14576 | 13240 | 18076 | 133129 | 133129 | 133129 |
| 2011 | 51196 | 49267 | 51196 | 15211 | 12900 | 17798 | 136099 | 136099 | 136099 |
| 2012 | 50852 | 49505 | 50852 | 15804 | 12568 | 17341 | 139128 | 139128 | 139128 |
| 2013 | 50510 | 50171 | 50510 | 16356 | 12245 | 16895 | 142218 | 142218 | 142218 |
| 2014 | 50171 | 50171 | 50171 | 16460 | 14007 | 16460 | 145370 | 145370 | 145370 |
| 2015 | 49834 | 49834 | 49834 | 16037 | 16037 | 16037 | 141825 | 141825 | 143288 |

Table 4.2 shows that the loss under scenario 2 is the least (in terms of NPV in 2002) for each of the three crops.

**Table 4.3. Total Economic loss incurred by banning MB used in the production of vegetable, strawberries, medical herbs (10,000 Yuan)**

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| NPV in 2002 | 986459 | 970416 | 1002624 |
| 2003 | 4475 | 4475 | 4475 |
| 2004 | 11243 | 11243 | 11243 |
| 2005 | 19849 | 19849 | 19849 |
| 2006 | 30011 | 29265 | 32359 |
| 2007 | 70464 | 68995 | 74460 |
| 2008 | 125316 | 123153 | 129633 |
| 2009 | 177635 | 174766 | 181724 |
| 2010 | 199248 | 195600 | 202748 |
| 2011 | 202506 | 198266 | 205093 |
| 2012 | 205784 | 201201 | 207321 |
| 2013 | 209085 | 204634 | 209623 |
| 2014 | 212001 | 209548 | 212001 |
| 2015 | 207695 | 207695 | 209159 |

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