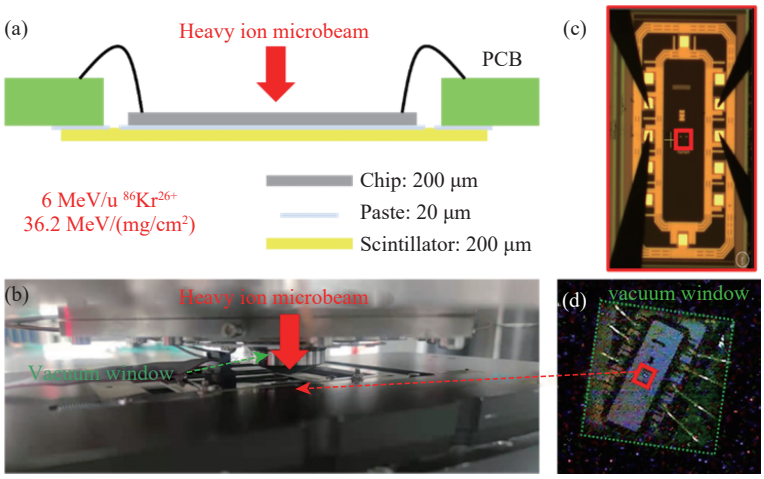

Fig. 1 (color online) Heavy ion irradiation test at the HIRFL microbeam facility: (a) The sample installation, (b) The photo of vacuum window and DUT under irradiation; (c) The photo of PAVLOV chip taken before the test and the core area of the chip (red box); (d) The microscopic photo of the chip taken through the vacuum window and the irradiation area of the large beam spot (red box).

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5 - 43 Enhancement of Enduracidin Production via Alleviation of Oxidative Damage Using Sweet Sorghum Juice as a Feedstock*

Hu Wei, Liu Lu and Chen Jihong

Biochemicals production from sweet sorghum juice is the preferred alternative, but the fermentation efficiency should be further enhanced. Oxygen-mediated microbial cell damage has been reported to boost cell growth and biochemicals production[1]. In present study, the effect of Vc addition on enduracidin production of *Streptomyces fungicidicus* M30 screened after heavy ion mutagenesis, was assessed. As shown in Fig. 1(a), enduracidin titer was significantly enhanced when 90 mmol/L Vc was added into fermentation medium at 2 or 4 d ($P < 0.05$ or 0.01), and the highest enduracidin production was achieved by Vc with the addition time at 4 d. In addition, complete time profiles of cell growth and enduracidin production by M30 strain with the optimized addition amount of 90 mmol/L Vc, were also conducted during all cultivations (Fig. 1(b)). The results showed no significant difference in cell growth at any fermentation phases when Vc was added. However, the addition of Vc led to approximately 9.6 % increase of obtained enduracidin accumulation compared to that with non-supplemented group after 10 d fermentation. The result indicates that the addition of 90 mmol/L Vc can promote enduracidin accumulation.

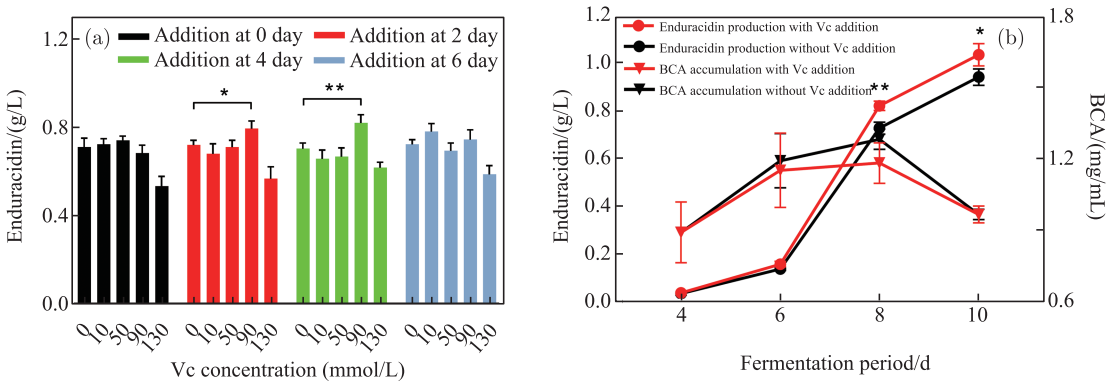

Fig. 1 (color online) (a) The effect of Vc concentration and addition time on cell growth and enduracidin production, (b) Enduracidin production and cell growth when 90 mmol/L Vc was added at 4 d of fermentation. The error bars in the figure indicate the standard deviations of three parallel replicates, and $^*P < 0.05$ indicated a significant difference and $^{**}P < 0.01$ indicated a highly significant difference.

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* Foundation item: User Program of HIRFL (HIR20PY014)

5 - 44 Effects on the Content of Flavonoids in *Scutellaria baicalensis* Georgi Irradiated by Carbon Ion Beams*

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The dry root of *Scutellaria baicalensis* Georgi (*S. baicalensis*) has the effects of clearing heat, dryness and dampness, purging fire and detoxification, calming the fetus according to Chinese Pharmacopoeia[1]. Modern research has shown that it contains various active ingredients[2], including flavonoids, phenylpropanoids, steroids, *etc.,* which are the material basis for its medicinal effects. Among them, flavonoids, the main active ingredients, also affect the quality of *S. baicalensis*. Heavy ion beams have high linear energy transfer, which can induce higher mutation frequency and wider mutation spectrum of plants. At present, it is widely used in the breeding practice of crops and medicinal plants[3,4]. And in modern medicinal plant breeding, one of the ideal goals is to improve active ingredients[5]. However, the effects on the content of active ingredients, especially flavonoids, in *S. baicalensis* by heavy ion beams irradiation have not been reported.

In this study, the seedings of *S. baicalensis* irradiated by carbon ion beams (CIB) grew in light cultivation room. After 9 weeks, the content of total flavonoids, baicalein and wogonin of *S. baicalensis* were measured (Fig. 1). The results showed that the content of total flavonoids increased by 14.69% and 25.32% at 10 and 30 Gy, respectively, while it decreased by 8.55% and 4.87% after 5 and 20 Gy radiation, respectively. And the content of baicalein and wogonin increased by 64.22% and 112.19% at 10 Gy, while the remaining doses had little impact on them. These results indicated that CIB radiation could promote the accumulation of active ingredients of *S. baicalensis* in a low dose. These results provided recommended doses for carbon ion beams radiation breeding of *S. baicalensis*.

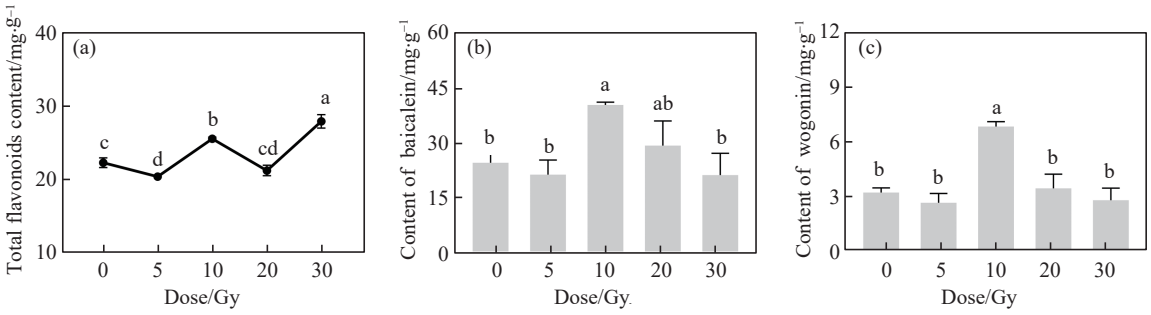

Fig. 1 (color online) Flavonoids content of S. baicalensis seedings. (a) content of total flavonoids, (b) content of baicalein; (c) content of wogonin. ANOVA (Tukey) assay were used ($P < 0.05$) to examine the statistical significance of the results.

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