

紫露草微核技术对两种保鲜剂的诱变测试

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摘要 某些用在果蔬保鲜上的杀菌剂,其毒性和诱变性对人类健康均可能存在危害,但人们常常只注重其毒性而忽视其诱变性。以紫露草微核技术对苯来特和托布津在其最低有效浓度(0.1%和0.07%)下进行诱变试验,以未加氯的自来水作空白对照,马来酰肼(MH)为阳性对照。结果表明:苯来特(0.1%)的突变率与空白对照相比差异极显著,且有许多四分体核、质分辨不清(均染深色),浓度稀释至0.05%的突变率比0.10%的还要高,但核、质分辨不清的四分体很少,这表明它不仅是一种强的诱变剂,而且可破坏内膜系统,使细胞质和核内物质混合。托布津在试验中表现出的诱变性亦极强,结果表明,也是一种诱变剂。

关键词 保鲜剂 最低有效浓度 诱变性

在我国,广泛应用于果蔬保鲜的杀菌剂或抑菌剂,对人类健康潜在的危害例如致突变性和致癌性等等,常常为人们所忽视,我们以紫露草微核技术对常用于水果保鲜的两种杀菌剂在其最低有效浓度下进行诱变测试。

紫露草微核技术是测定环境诱变剂最有效的方法之一^[1]。原理是花粉母细胞在减数分裂时期若受诱变剂的作用,将受到损伤而产生染色体碎片,这些碎片在四分体时期形成微核。在一定的剂量范围内微核率的大小与剂量呈正相关关系。

1 材料和方法

植物材料的培养、处理及制片和数据处理等检测技术参考马德修、王英彦所报道的方法^[2,3]进行。

试验用的两种保鲜剂及其浓度是:苯来特0.1%,托布津0.07%,浓度为它们的最低有效浓度,以自来水(未加氯的井水)为空白对照,以40ppm的马来酰肼(MH)为阳性对照。在实验中由于0.1%的苯来特对细胞有严重的杀伤作用,因此增加0.05%苯来特的对比处理。

2 结果与讨论

所得的数据处理后列于表1:

表1的数据表明,苯来特和托布津的平均微核率远高于空白对照;统计检验结果,各处理与对照之间差异均极显著;说明这两种物质在试验所用的各浓度下均具有极强的诱变性。其中以苯来特的诱变能力尤强,0.05%的苯来特诱变率甚至高于阳性对照物马来酰肼,马来酰肼是

目前国际上公认的诱癌物质,因此苯来特的诱变性很值得人们注意。托布津的突变率虽然偏低,但统计检验结果表明它仍是一种强的诱变剂,这与我们另外的一个实验⁽⁴⁾结果相一致。

表1 紫露草微核技术对苯来特和托布津的诱变测试结果表

处理	样本数 n	四分 体数	平均微核 率(%)	与空白对照 差异显著性
自来水	5	1500	0.4	
苯来特 (0.1%)	5	1500	1.07	**
苯来特 (0.5%)	5	1500	1.96	**
托布津 (0.07%)	5	1500	0.73	**
MH (40ppm)	5	1500	1.56	**

“**”表示差异极显著 ($p < 0.01$)

同时我们在镜检过程中发现,0.1%苯来特处理组产生的四分体中有许多核、质分辨不清(即核部分和质部分均染成深色),说明苯来特在最低有效浓度(0.1%)下不仅具强的诱变性,而且还可能破坏细胞内膜系统,使核质混和,从而影响微核的观察,因而出现0.1%苯来特处理组的微核率小于0.05%处理组的现象。0.05%苯来特处理组微核率虽然较高,但核、质模糊不清的四分体很少。

苯来特是目前荔枝保鲜试验中被认为较有效的药剂之一。托布津则已广泛应用于农作物的杀菌、抑菌及苹果、柑橙等水果的保鲜,本实验发现这两种药剂在常用浓度下却有很强的诱变性。据此可认为它们对人类健康可能存在着潜在的威胁,由此提醒人们在这方面应引起足够的重视。

参考文献

- 1 林光恒, 马德修. 环境诱变剂植物检测系统. 环境科学, 1987, 8 (6).
- 2 马德修. 紫露草微核对环境污染物的监测法. 山东海洋学院学报, 1981, 11 (2).
- 3 王英彦等. 紫露草四分体微核检测技术中的几个问题. 环境科学, 1986, 7 (2).
- 4 黄宁珍等. 紫露草雄蕊毛突变法对九种农药的检测报告. 癌变·畸变·突变, 1992, 4 (4).

Detecting the Mutagenicity of Two Agents Used in Fruit Store by Tradescantia Micronucleus Assay

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Abstract Some bactericide agents used in fruit store have toxicity and mutagenicity and harm to human's health. But many people always notice its toxicity only and neglect its mutagenicity. So we detected the mutagenicity of Banlate (0.1%) and Thiophanate (0.07%) in its minimal effective dose by Tradescantia Micronucleus Assay. These two bactericide agents were usually used in fruit store in China. In this experiment well water was used for negative control and MH

(Maleic Hydrazide) for positive control. The results indicate that the mutagenic frequency of Banlate (0.1%) is far higher than the negative control, and in this concentration there are many tetrads whose nucleus and protoplasm couldn't be distinguished clearly (both sections are dyed deep red); when the solution is diluted to 0.05%, its mutagenic frequency would be higher than 0.1%, but few tetrads whose both sections are dyed deep red. All these show that Banlate not only is an effective mutagen but also could destroy the membranes system in cell and mix up protoplasm and nucleoplasm. Thiophante was a strong mutagen too, it is an effective mutagen also. In China Thiophante was used widely in fruit store such as apples and oranges, and this is a remarkable problem.

Key words bactericide agents, minimal effective dose, mutagenicity

(上接第25页)

Effect of Cadmium on Photosynthetic Rate, Respiratory Rate and Membrane Permeability of Isolated Leaf Disc

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Abstract Isolated tobacco leaves were treated with cadmium, the treatment of 0.005mmolCd/L caused the decreasing of photosynthetic rate, 0.0275 mmolCd/L resulted in decreasing of chlorophyll content and 0.1 mmolCd/L caused the increasing of cell membrane permeability. As the increment of Cd concentration and the duration of treatment, the photosynthetic rate and chlorophyll content decreased further, the damaging degree of membrane increased, while the variation of respiratory rate appeared decreasing—increasing—decreasing.

Key words cadmium treatment, cell membrane permeability, net photosynthetic rate, dark respiratory rate, chlorophyll content