Analisis peran ion kalsium terhadap struktur kromosom gandum (triticum aestivum) menggunakan mikroskop cahaya = Analysis of calcium ions effect on wheat (triticum aestivum) chromosome structure using light microscope

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Abstrak

Kondensasi kromosom memainkan peran penting dalam pembelahan mitosis. Ion Ca2+ diketahui berperan penting dalam proses kondensasi kromosom. Sejauh ini, studi tentang peran Ca2+ dalam kromosom sel hewan telah dilaporkan melalui penggunaan 1,2-bis (2- aminophenoxyethane-N,N,N,N-tetraacetic acid) (BAPTA) dan Ethylenediamine- tetraacetic acid (EDTA) sebagai agen pengkelat ion Ca2+. Namun, penelitian tentang peran Ca2+ pada kromosom tanaman masih sangat terbatas. Penelitian ini dilakukan untuk mengetahui pengaruh Ca2+ terhadap kromosom gandum (Triticum aestivum) dengan pemberian 1mM BAPTA sebagai agen pengkelat ion Ca2+, 1mM EDTA sebagai agen pengkelat kation divalen umum, dan phosphate buffered saline (PBS) sebagai kontrol menggunakan mikroskop cahaya. Preparasi kromosom dilakukan dengan cara akar gandum dipotong dan diberi perlakuan colchicine sebelum dilarutkan dalam 2% Paraformaldehyde (PFA). Kemudian diinkubasi dengan 2,5% selulase dan 2,5% enzim pectoliase pada suhu 37°C selama 1 jam. Sampel kemudian disaring dan disentrifugasi untuk memperoleh sampel yang mengandung kromosom. Sampel kemudian diberi perlakuan dengan 1 mM BAPTA, 1 mM EDTA, dan PBS, dan diwarnai dengan Aceto orcein. Kromosom kemudian diamati di bawah mikroskop cahaya. Struktur dan kepadatan warna kromosom, serta panjang, lebar dan luas kromosom diamati dan diukur. Hasil pengamatan kualitatif menunjukkan bahwa struktur kromosom pada kontrol lebih rapat dan pendek sedangkan kromosom yang diberi perlakuan 1 mM BAPTA dan 1 mM EDTA mengalami dekondensasi, melebar, dan berwarna pucat. Hasil pengukuran kuantitatif menunjukkan bahwa kromosom Kontrol, BAPTA, dan EDTA masing-masing memiliki panjang 10.763 m, 14.845 m, 17.154 m, lebar 1.570 m, 1.637 m, 1.723 m, dan luas 18.172 m, 24.644 m, 29.687 M. Hasil uji statistik menunjukkan bahwa pengaruh BAPTA dan EDTA terhadap panjang dan luas kromosom berbeda nyata (< 0,05). Hal ini membuktikan bahwa Ca2+ memiliki peran penting dalam menjaga struktur kromosom gandum.

.....Chromosomal condensation plays an important role in the mitotic division. Ca2+ ions are known to play an important role in the chromosome condensation process. So far, studies on the role of Ca2+ in animal cell chromosomes have been reported using 1,2-bis (2-amino phenoxy ethane N, N, N, N-tetraacetic acid) (BAPTA) and Ethylene diamine tetraacetic acid (EDTA) as Ca2+ ions chelating agents. However, research on the role of Ca2+ on plant chromosomes is still very limited. This study was conducted to determine the effect of Ca2+ on wheat chromosomes (Triticum aestivum) by administering 1mM BAPTA as a Ca2+ ion chelating agent, 1 mM EDTA as a general divalent cation chelating agent, and phosphate-buffered saline (PBS) as a control using a light microscope. For chromosome preparation, the root tips of wheat were cut and pretreated with colchicine before being dissolved in 2% Paraformaldehyde (PFA). The roots were then incubated with 2.5% cellulase and 2.5% pectoliase enzyme at 37°C for 1hour. The sample is then filtered and centrifuged to obtain a sample containing chromosomes. Samples were then treated with 1 mM BAPTA, 1 mM EDTA, and PBS and stained with Aceto orcein. Chromosomes were then observed under a light

microscope. The structure and color density of the chromosomes were observed. The length, width, and area of the chromosomes were also measured. The qualitative observations showed that the chromosome structure in control was denser and shorter while the chromosomes treated with 1 mM BAPTA and 1 mM EDTA were decondensed, widened, and had pale color. The quantitative measurement showed that length, width, and area of chromosomes for in control, BAPTA, and EDTA were 10.763 m, 14.845 m, 17.154 m; 1.570 m, 1.637 m, 1.723 m; and 18.172 m, 24.644 m, 29.687 M respectively. The statistical results showed that the effect of BAPTA and EDTA on the length and area of chromosomes were significantly different (< 0.05). This result proves that Ca2+ has a vital role in maintaining the chromosomal structure of wheat.